IN THIS ISSUE: Electricity and the Lumber Industry

JOURNAL OF ELECTRICITY

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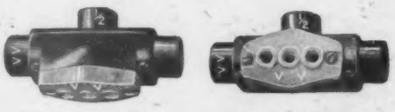

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JOURNAL OF ELECTRICITY

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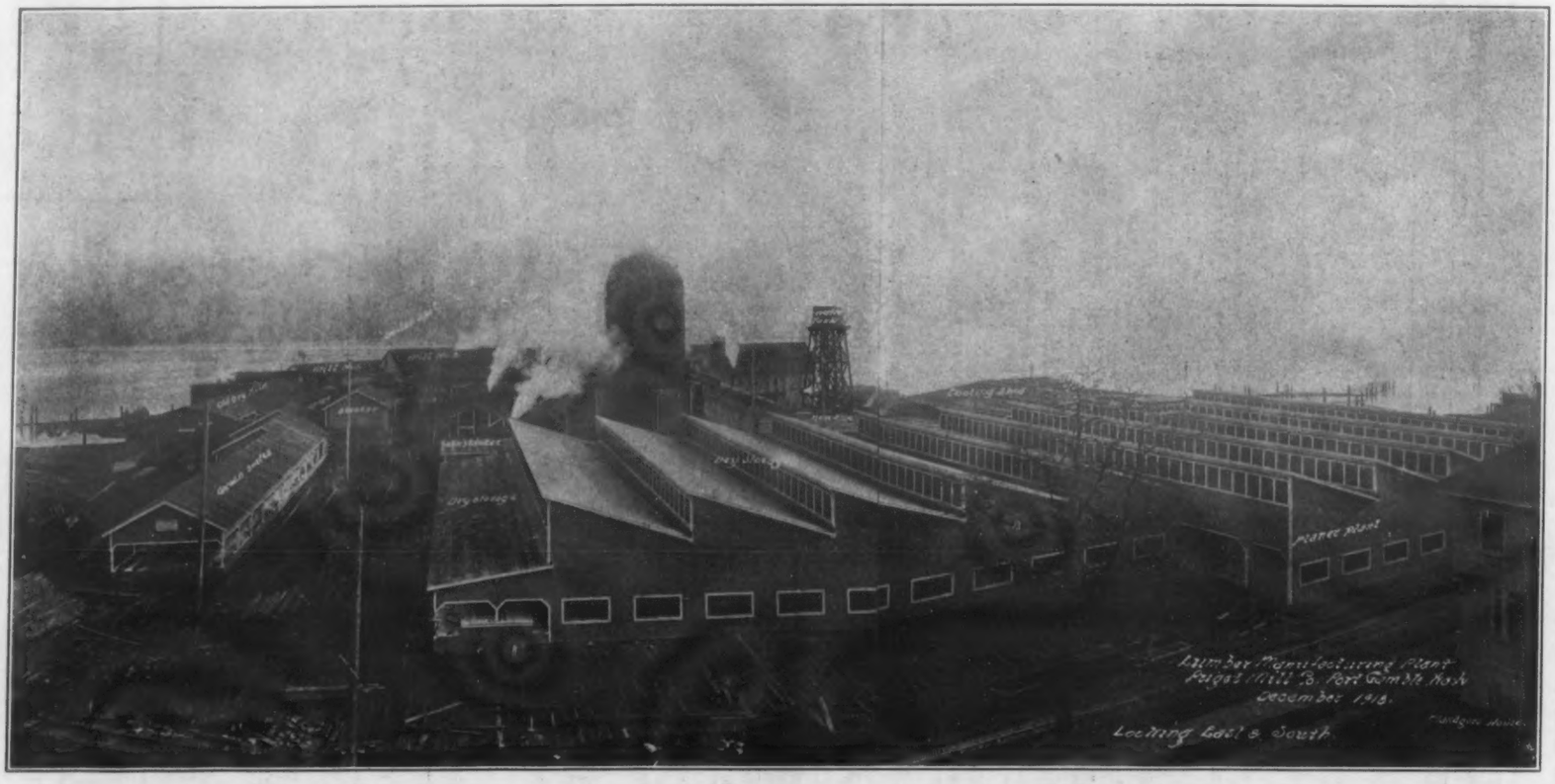

ALTHOUGH recent years have seen an extensive growth of manufacturing interests on the Pacific Coast, the major industries of this great region must always be associated with the development of its rich natural resources. The increasing use of electricity in agriculture and in the lumber industry, therefore, mark a progress in the vital growth of the region. In the fact that more electricity is used upon the farms of the West than in the field of agriculture in the entire remainder of the United States, and in the widespread application of electricity to the lumber industry lies abundant testimony to the vital service which the electrical industry is rendering to the growth and prosperity of the West.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43 SAN FRANCISCO, DECEMBER 1, 1919 Number 11

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THANKSGIVING

IN this glad season of Thanksgiving, when the people throughout all our great land are rejoicing in their prosperity, the electrical industry likewise may feel gratitude for the good things of the past year. During the twelvemonth which has seen this country rid itself of the hateful incubus of war, our industry has gone forward united and strong. In its retail and wholesale transactions, modern progressive methods have been perfected; everywhere the "method electrical" is coming into its own in home and factory, and the attitude of the public at large toward the power companies becomes that of healthy confidence. Those who labor in the industry, taking pride in work well done, have remained well content, and their production has gone on unimpaired. With the vast expansion of America's export trade, both in the Pacific and the Atlantic, the output of electrical workshops has gained rich new markets abroad. Engineering and scientific progress, given an impetus by the call of war, continues unabated. Technical journals devoted to the upbuilding of the industry have witnessed remarkable growth. More and more the magic agency of publicity has this year been called on to acquaint the public with electrical methods. Everywhere mutual trustfulness and cooperative helpfulness are apparent; and the shadows of outworn suspicions and rivalries have disappeared before the light of a new day. How can anyone survey the year's work save with supreme satisfaction? May we attain our next Thanksgiving with as much to be grateful for. The "word from the West" is one of optimism and hope for the coming year.

An Encouraging Public Attitude

Truly gratifying to all those concerned in the advancement of the electrical industry of the West were the remarks of E. O. Edgerton, president of the California State Railroad Commission, at the great California Electrical Cooperative Campaign dinner in San Francisco, November 15th. With words of sincere utterance he proclaimed his faith in the future of the industry in this state, and predicted an unprecedented growth in the next decade. R. H. Ballard, president of the National Electric Light Association, had in his splendid address of the same evening estimated that during this ten-year period $250,000,000 would be needed to finance electric power developments in California; yet Mr. Edgerton deemed this estimate decidedly conservative and stated that it would in all likelihood be exceeded by many millions more.

A great opportunity is before the power companies of California, he declared, and also a great responsibility. The public requires good service always, and if granted that is willing to pay a reasonable price in return. Its attitude is friendly, not hostile; there is no objection to the power companies making a fair profit on their investments. The confidence of the people in the great public service corporations has been heightened by the open manner in which their financial affairs have been transacted, and Mr. Edgerton expressed the opinion that the public utilities are today the best managed concerns in California.

The attitude of the California State Railroad Commission, thus ably presented by its president, is representative of that of many regulating bodies throughout the West. For some years there has been growing among them a feeling of just friendship toward the public service companies not at all inconsistent with their obligations to the people at large. They have notably displayed a spirit of commendable cooperation with the electric power interests, and have manifested a desire to gain personal contact and association with the leaders of the industry, that they might the more intimately understand its needs.

This California commission, for example, has been busy gaining a first-hand knowledge of all the agencies generating and supplying electric power. Its members, accompanied by officials of the companies concerned, have made thorough tours of inspection over the various systems, with a view to aiding the directors of the industry in their plans for further development. The good results of these purposeful trips are already becoming apparent, and are reflected in utterances such as that of Mr. Edgerton to the representatives of the electrical industry in California. It is sincerely trusted that all regula-

tory commissions are taking a similar broad-visioned policy in regard to the proper development of that electric power which means so much to the upbuilding of the great West.

Editorial Suggestions

One of the ways in which contractor-dealers can forward their own technical grasp of affairs electrical will be to send in to the University Extension Division of the State University nearest them, or to the technical press, suggestions as to what is desired in the way of educational aids. Many suggestions have in recent days been sent in to the Journal of Electricity concerning a course in Elements of Electricity that has been appearing in the columns of the Journal of Electricity during the past few months. This course has unquestionably met with great success and has been followed by hundreds of students who have taken this course in many districts of the West.

It is now suggested that a course covering auto ignition, electricity on the farm, the uses of electricity in pumping plants, and other subjects, might well be discussed in a course of instruction to follow the present series. Contractor-dealers having suggestions will do well to send these in at once to the Journal of Electricity in order that proper consideration may be given to them. It is hard to estimate in full the vast good that educational courses of these characteristics will do for the contractor-dealer. A real service to the industry will be rendered by the contractor-dealer taking cognizance of the fact that information is wanted on this important line and his consequent sending in of suggestions to the Journal of Electricity will make possible an increased service to the industry on the part of both the Journal of Electricity and the University.

Steam Standby Plants in a Dry Year

The normal rainfall for California for November is somewhat over three inches. To date this year, less than one inch has fallen. It is to be hoped that this is not the forecast of another dry year, but at the present time, this portion of the Pacific Coast is undergoing all the effects of three successive abnormal seasons. The mountains are still practically bare of snow and the country is beginning to suffer agriculturally for the lack of rain. In consequence, in a region where three-quarters of the power consumed is ordinarily generated by water power, fully one-half of the output must now be furnished by steam. The present steam installations are inadequate comfortably to meet the demand, and plants are being forced, with the result that there have been occasional complaints on the part of city residents of a smoke nuisance from a plant not ordinarily in any way objectionable.

The situation is one which makes us recognize the necessity of steam standby plants even in the West. California is still hopeful of a wet season—and in any case is sure of sufficient to provide extensive, if not abundant, water power for the coming year. Meanwhile plans are in hand for increasing steam plant capacities to meet any future needs which may arise.

Question of Parallel Meetings

Both in the convention of the Pacific Coast Section, N. E. L. A., and in the National Association the holding of parallel meetings is to be done away with during the next year. Nothing but big national subjects and subjects of timely interest will be discussed. Subjects in which all branches of the industry—commercial, engineering, accounting, public policy—may express their viewpoint and thus bring about new angles of expression that hitherto have been lacking will be brought up for discussion.

It is true that some of the more important subjects of special interest may be overlooked in this work, and it might be well indeed to plan short sessions off by themselves to discuss more timely, intricate, specialized problems, but on the whole the question of the general meeting is one to be commended and one that will bring out the best thought and effort at a convention that is too short and too brief to handle more than those problems that are of great timely interest and that affect every one in every branch of the industry.

High Tension Direct Current Transmission

An interesting suggestion has recently come from Brussels for the establishing of a transmission line to extend from Belgium to Italy, a distance of 746 miles. The occasion for the discussion is the great need of Italy for coal, combined with great difficulties of transportation and consequent high prices of fuel. Prof. E. Guarini of Brussels proposes that energy be transmitted in the form of electric current, saving cargo space and costs of transportation. His idea is to establish large generating stations at Belgian coal mines, from which 500,000 to 1,200,000 kw. shall be transmitted at a pressure of 150,000 volts. The astonishing feature of the proposition is that this is to be accomplished by direct current.

Naturally enough, perhaps, no one in his own country seems to take Prof. Guarini entirely seriously. The proposal is one of such astounding magnitude, that it is set aside as not likely to be put into early operation. It is interesting to find that most of those considering the proposition seem to be unfamiliar with recent accomplishments in long distance transmission already in practice in the West. The distance covered by such a Belgium-Italy transmission line would not even constitute a world's record, the Yuma-Wonder line of the Southern Sierras Power Company of California extending for 830 miles across the desert. A voltage of 150,000 has been in successful use on the Big Creek line of the Southern California Edison Company for some time. Indeed, fewer operating difficulties have been experienced on this line than on adjoining low tension systems. The proposal of a 220-kv. line to extend the length of California, over 1,100 miles,

has recently been made without much question of its practical possibility.

Considering the established success which has already been achieved in this country in alternating current transmission, it is rather astonishing to find that this system is not even considered in the discussion. Of course, much wider experimentation and much greater success in the handling of direct current has been achieved on the continent than in the United States. There are many questions such as the alternative cost of developing Italy's water powers to fill the same need, the political difficulties involved, as well as technical intricacies which will probably keep the scheme from ever being tried out, but the mere discussion of this problem from a European standpoint will bring out much of interest to the engineers of the Western United States who have long been engaged in solving problems of a comparable magnitude.

The Value of Photographs

Visual instruction is today being brought more and more before the public as a most important means of carrying home a truth. As a consequence, the contractor-dealer and others engaged in merchandising will do well in these busy days to take continual photographs of their own establishments and other little ideas they may get throughout their communities and other portions of the business world with which they may be in contact.

Such photographs when kept on file and carefully studied bring out new ideas and new business methods, which will unquestionably prove of great value.

The question of publicity is not to be overlooked. These carefully preserved photographs make possible write-ups in the press that otherwise would be impossible of attainment. One very important function of the trade press is to carry broadcast, throughout every nook and corner of the nation, the good ideas that prevail in the trade. The Journal of Electricity can be of ever-increasing assistance to the electrical industry provided every one in this great industry of ours who is reached by its columns will see that live, active photographs, sketches and ideas are continually mailed in as they present themselves.

The Use of the Term "Central Station"

There has been considerable question of late as to whether the term "Central Station" as used by the electrical industry is not a misnomer, or, at least, a phrase that connotes to the mind of the general public something quite different from the meaning desired. This is especially unfortunate at the present time when the industry is endeavoring to impress the public favorably. The vast majority of people outside of the electrical industry have never heard of a "Central Station" in the meaning of "Power Company"—as a consequence their first thought is of the main police station or an institution for the control of public morals. Would it not be best entirely to do away with the use of this term and to substitute the simpler words "Power Company" which will not be misunderstood, nor involve unpleasant connotations?

It will be the constant policy and care of the Journal of Electricity in the future to do everything possible to forward the substitution of this term for that in present general use, and thus obviate any improper visualization that may appear in the public mind when it is desired to show the present day service of the Power Company in its efforts to meet the needs of the public.

When gaining more intimate contact with the public, it may become apparent that the terminology of the electrical industry requires further overhauling. Many people outside the calling have suggested that to the term "Jobber" is attached a somewhat sinister connotation when they first hear it. On the whole, this word, too, seems inadequate; perhaps "Wholesaler" would satisfactorily fill its place.

Should the Shop Be Closed Off From the Public?

The California Electrical Cooperative Campaign has decided that it is at all times the best policy to close the shop off from inspection in the contractor-dealer establishment. This is undoubtedly true as a general policy, since by far the major number of contractor-dealers keep their shops in poor repair and indeed in very poor order.

In instances, however, where the contractor-dealer shows an unusual genius in doing his repair work, might it not be well to glass off certain parts of his shop so that those interested in following some of the newer ideas in electrical repair work may follow the genius of the one at work? It is a well known fact that recent bakeries, with shops on well located corners of large cities, have done a flourishing business in exposing the entire bake-shop to the gaze of the public. Idle curiosity, it is true, in many cases may be assigned as the reason for increased gazing in on the work. However, idle curiosity may be vastly capitalized in electrical work as it has in the far less interesting art pertaining to the bakery. It might be well in those cases where electrical contractor-dealers display considerable ingenuity in repair work and efficiency of design to glass in a certain part of this work and make it open to the public. The experiment would be interesting to follow.

IN THE NEXT ISSUE: Publicity in all Branches of the Electrical Industry.

Electrical Logging

BY R. E. GRAY

(The fact that the wealth of the West is derived largely from its natural resources, makes the lumber industry of the Northwest of primary importance to all who are interested in Western development. The contribution which electricity is making, and can make, to this industry, is discussed in the following paper recently read before the Pacific Logging Congress at Portland, Ore.—The Editor.)

The first mention of electricity being used as a motive power on logging apparatus in the Snoqualmie Falls district was made as early as 1914, but it was not until a year or more later that an arrangement was made between the General Electric Company, the Willamette Iron Works, of Portland, and the Snoqualmie Falls Lumber Company, to collaborate in the building and trying out of an electrically driven yarder.

Electric yarding donkey used by the Snoqualmie Falls Lumber Company in logging work in the Oregon woods

The proposition was for the Willamette people to build the yarder, the General Electric Company to furnish the motor and controller, and the Snoqualmie Falls Lumber Company to build and maintain the necessary power lines to the yarder and try it out on approval in actual logging.

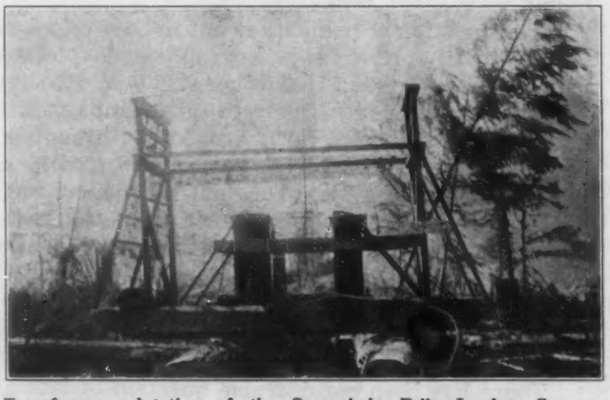
The yarder finally arrived in the latter part of 1916 and was turned over to the logging superintendent, to be used in clearing ground for a mill site.

The rig was pulled out to where it was to be worked by a steam donkey or locomotive, and rigged ready for operation, but we discovered we had nothing to blow the whistle with as we were without steam. Some of the electricians who were all hanging around to see the circus suggested using a Klaxon horn similar to the horns used on automobiles. This we did with a fair amount of success, but only after we located the horn at about fifty feet distance from the machine, as the sound vibrations of the horn synchronized with the rattle of the gears to such an extent that the donkey puncher did not catch all the signals.

The first trouble we met with was in not being able to control the speed of the machine. The resistance grids furnished to control the speed were designed to operate under load, but the time we needed a slow speed was in tightening the choker and consequently no load on the motor. It was discovered that by starting the motor with the controller handle in the first position and sliding it back between the off position and the first position that the motor would run at a very low speed, the cable just creeping along, giving the hook tender just what he needed. As the motor operated under this condition at a speed that was satisfactory and as neither motor nor controlling devices showed any distress while operating in this manner the electrical department consented to the continuation of the tryout.

The second difficulty met with occurred in the drum controller used to start, stop and control the speed of the motor. The original wiring plan of the controller drum connected the motor stator through the drum contacts with the line serving the motor. This connection resulted in excessive arcing of the drum contacts serving the stator winding and was overcome by installing a 3-pole 500-amp. contactor panel to handle this part of the motor circuit, the operating coil of the contactor panel being energized through the same drum contacts originally used for the stator circuit.

By installing this contactor we got rid of delays caused by burnt-up drum contacts, and having found a position on the drum controller where we were able to get a satisfactory minimum speed, we were able to finish the job of clearing and observe the performance of the equipment further. It was decided to give the machine a further trial on actual logging in the woods.



Transformer substation of the Snoqualmie Falls Lumber Company, mounted on skids. In the foreground can be seen the submarine cable connecting the transformers with the electric yarding donkey.

It would perhaps be enlightening and in order, at this point, to give a description of the outfit, which may simply be described as an electric driven yarding engine consisting of a Willamette Iron Works Himboldt three-drum yarder with boiler and engine omitted, and a General Electric Company 200-hp. specially wound rotor type, three-phase, 60-cycle, 550-volt motor used in its place.

At this time when it was decided to try out the yarder further on, it was necessary to build a power line from our mill power plant out to the first operation or landing.

We decided for the sake of economy in copper used for transmission, and in view of the fact that if this outfit proved successful, others would be used in the future, to build our line suitable for a voltage of 33,000. Our power plant voltage is three-phase, 550-volt, 60-cycle, and the transformers which the General Electric Company had furnished to be used were 13,200/550-volt with a capacity of 250 kva., therefore we went ahead with this equipment as the securing of transformers had been difficult.

The size of these transformers was considered adequate at least for a test by the General Electric Company and we began operations, using one at the power plant to step the voltage from 550 volts up to 13,000 and one at the other end of the line out in the woods to step the voltage down from 13,000 volts to 550 volts, the proper voltage for the motor.

The first landing was situated 14,000 ft. from the power house, and between them we built a line as stated before, with spacings and insulators for 33,000 volts.

At this time, when the transmission line had been designed and was being built, no tenable theory had been advanced to explain why the motor should run at all with the controller handle in the position we were running on, and it was not long before we had discovered that the motor refused to do the tricks it had done before in running slow enough.

Our electrical department started investigations, beginning on the theory that it was necessary only to add resistance in the rotor circuit until the motor speed was lowered sufficiently, and to rearrange the wiring of the drum controller so as to accommodate a wider range of control. We connected up a barrel of water in each of the three phases of the rotor circuit, varying the resistance in each barrel until we got just the speed required by raising or lowering the terminal connecting the barrel to the circuit.

After adjusting our terminals in the barrels to a place where the motor ran at a satisfactory speed it was only necessary to calculate the watts dissipated in each barrel and the carrying capacity necessary to be obtained in some other form of resistor, as it can be readily seen that to carry a lot of water barrels around with a donkey engine would be out of the question.

Our tests showed us that it was necessary to add a resistance of 3 ohms in each of two phases and a resistance of 6 ohms in the remaining phase of the rotor circuit.

All of this information was forwarded to Portland, where resistance grids to suit our specifications were built up.

After receiving these resistance grids, we found that we were able to control our motor speed to an extent that gave us a range of speed on the main line of from 60 ft. per minute to 300 ft., which has been perfectly satisfactory in regard to the slower speed, but the matter of getting a higher maximum speed is now under advisement.

With the contactor panel installed to take care of the arcing which occurred in the drum controller and additional resistance in the rotor circuit to control the motor speed, we were ready to start off with the exception of some means of signaling.

We overcame the lack of steam to blow the signal whistle by installing an Ingersoll-Rand Company 2½ x 3 air compressor belted to a 3-hp. motor. The air compressor is piped up to a storage tank 30 by 60 inches and the pressure is kept up to 100 lb. This tank is larger than necessary but we used it on account of having it on the ground at the time we were fitting up to blow the signal whistle. By running the motor driving the air compressor about five minutes every hour we are able to maintain a pressure sufficient to take care of all whistling done.

We began to log in October, 1918, with a 250-kva. transformer at each end of the transmission line. The transformer at the donkey end of this line was placed about three or four hundred feet from the spar tree to be out of the way of both yarding and loading.

The 13,000-volt transmission line was terminated on two poles at 8-ft. centers, at the transformer. On these poles furnishing the terminal for the transmission line, a disconnect switch was mounted, making it possible to cut the current off at this point. The current from the 550-volt side of the transformers is carried to the motor through a 3-conductor armored submarine cable, laid along the ground between transformers and yarder motor.

Logging with an electric yarding donkey. The electrically driven yarder logs for 52c. per M. less than the steam driven, and will perform all the operations of which the steam driven machine is capable.

It soon developed that a 250-kva. transformer was too small, the voltage being reduced on ordinary heavy pulls from 560 to 400 volts, which, based on a steam engine working at 200 lb. pressure, would be equivalent to lowering the steam pressure to about 105 lb. Nevertheless during a period of 210 days, completing 9 settings and covering an area of 240.6 acres, 14,883,332 feet log scale of timber was logged, an average of 70,873 ft. per day, with this outfit under the disadvantageous condition of being short of power due to insufficient transformer capacity. It was necessary to extend our transmission line 7900 ft. to reach all of the timber included in the operation just mentioned and 50% of the line was run over logged-off land before the timber was reached.

The cost of building and maintaining the transmission line has been calculated on a basis of 5% depreciation for the copper conductor, 20% depreciation for cross arms and insulators and 100% for labor and incidentals.

A total of 21,900 ft. of transmission line was built to get the 14,000,000 odd ft. of timber, and as 12,000 ft. of line was taken down to be used on other extensions, the cost of building and maintaining the transmission lines has been arrived at by using the percentages of depreciation mentioned on 12,000 ft. of line. This added to the cost of maintaining the motor and controller, shows a total cost of 11c. per M.

This is a very conservative estimated cost, for possibly never will we find it necessary to build and take down as much line again to log off 14,000,000 ft.

In comparing costs of logging with electricity and steam it is found that the electrically driven yarder logs for 52c. per M. less, a total saving of $7,280.00 in 210 days on a yarder alone, and it is our opinion that this saving would be more than doubled if an electric driven loader were used in conjunction with the yarder.

In this case, no water whatever would be necessarily provided and all the other incidental maintenance costs, such as train crew services delivering fuel oil, cleaning flues on Sunday, watchmen to put out fires, etc., for then the fire hazard would be practically wiped out.

At present 32,150 ft. of transmission line has been built, 12,000 ft. taken down, leaving 20,150 ft. standing.

The question of the line crew being able to keep ahead of the other operations at first looked as though it would be quite a problem, but taking into consideration that 32,150 ft. of line has been built in sections of 14,000 ft., 7,900 ft., and 10,250 ft., 12 settings having been made and the yarder crew never delayed a minute, and this with only about 3,000 ft. of line material surplus, we can consider this another difficulty connected with electric logging, met and overcome.

To go back to the matter of transformer capacity, it had been demonstrated that 250 kva. was not enough. At present, three 200-kva. single-phase transformers are being used to step the line voltage up to 13,000 volts at the power house and the two 250-kva., 3-phase transformers are being used in the woods to step the voltage down to 550.

It was found that it required about half a day for four men to set up the transformer in the woods every time the yarder was moved to a new setting. This has been cut down to about one hour for one lineman by mounting the transformers on a small sled, a structure being built on the sled to support the incoming line wires and disconnecting switch, which is never taken down.

Beginning September 2nd, and during twenty-four days' actual logging with ample transformer capacity, and two "Wobbly" walk-outs thrown in, the electric yarder has logged 1,782,339 ft., an average of 77,500 ft. per day, off a tract of 30 acres. This shows an increase of 7500 ft. above the average reached when running with insufficient transformer capacity. The largest amount of logging ever done up to date by the electric yarder in one day is 186,909 ft.

In its present stage of development, the electric yarder is showing results equal to a 12 x 14 Willamette at a cost of 52c. per M. less.

It might be well to mention that the General Electric Company finally explained that the reason for the motor's running at all with the secondary circuit open was because a feather edge had been left across the slots in the rotor, thereby allowing eddy currents to rise sufficiently to produce enough flux to furnish a small amount of torque revolving the rotor slowly. This is very possibly the explanation. Anyway the eddy currents did not eddy after the machine had stood idle a few months, the feather edge of steel probably rusting off. At all events we were forced to add from 3 to 6 ohms resistance in each phase of the rotor to get the speed down, and as this worked out, we have never followed up the question.

The yarder has been developed to a degree where it requires a small amount of maintenance, in fact has run 234 days without a single shut-down for repairs to any part of it, electrical or otherwise. The renewals that have been made have been done during shut-downs at noon or on Sundays and these were only minor items, mostly drum controller contacts.

The machine will do all the stunts a steam driven yarder will do, such as load itself, tighten up guys and the control, while not being in our opinion perfectly safe to raise and lower a rigger on the spar tree.

It has been proven that 250-kva. transformer capacity is not enough, that 500-kva. is enough, but how much more than enough we cannot at this time say, not having had the time to test the peak load necessary to do the heaviest pulling the yarder is called on to do.

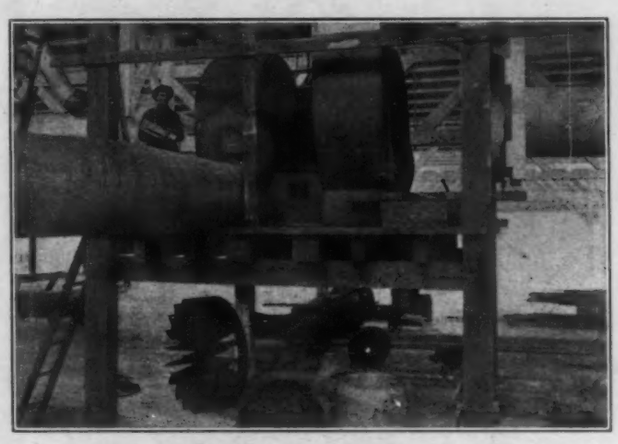
Tests have shown that it requires 2.8 kw-hrs. energy input to log 1000 ft. Up to the present it has required the building of 32,150 ft. of transmission line to log 16,665,671 ft. of timber off 270.6 acres in 234 days.

It is safe to say now that if the electric yarder had reached a stage of development it now has reached, at the time equipment was being purchased for our logging operations, at least one of the two camps maintained here would very possibly have been electrified.

Changing a Sawmill to Electric Drive

(The importance of the lumber industry to the Northwest makes modern developments in the sawmills of that region of especial interest. The change to electric drive is the most prominent feature of this development at the present time, and the installation described below is one of the more recent examples of the changes which are being effected.—The Editor.)

The changing of sawmill plants from steam to electric drive goes steadily forward in the Northwest. A conspicuous example of this process is found in the case of the Puget Mill Company at Port Gamble, Washington, where the Standard Electric Company of Seattle, under the management of Herbert C. Moss, is carrying out a contract for changes from steam to electrical equipment amounting to about $30,000. This installation is typical of that of numerous sawmill companies in the Northwest with plants beyond the reach of central station electric power. In such cases the operation of a steam-electric plant in which all mill machinery and shop tools are motor-driven and in which sawmill refuse is utilized for fuel, proves the most economical and efficient.



Blowers with Allis-Chalmers motor and double extended shaft, in the Puget Mill Company's plant, Port Gamble, Wash.

Generating System —

There are two independent sawmills in the property which have been operating continuously since 1854. In these the old steam-boiler installations will continue to be used for driving the Allis-Chalmers 1000-kw. turbo-generator. Electric energy produced in this way is to be used for operating 75 Allis-Chalmers motors with a combined capacity of 1250 horsepower, for driving saws, blowers, transfer chains, shop tools and the machinery of a new planing mill.

The head saws of each of the two sawmills are being driven by a 300-horsepower slip-ring Allis-Chalmers motor and are operating in a far more satisfactory manner than they ever did with steam.

The company has purchased a 200-kw., three-phase, 440-volt Allis-Chalmers turbine to be delivered early this fall. This turbine will be tied in on the busses with the 1000-kw. machine, and switching arrangements will be made so that each machine can be operated either independently or with the other. The 200-kw. turbine will be used principally for operating the lighting system at night when the larger machine will be shut down. There is enough reserve capacity in this generator to operate a number of the planers or other machinery on night shift without running the larger generator.

Motor Equipment for Planing Mill —

There are six large planers with 50 to 75-horsepower motors, and there is an extensive system of transfer and sorting chains for carrying the lumber from the two sawmills to the planing mill, a distance of some 600 feet.

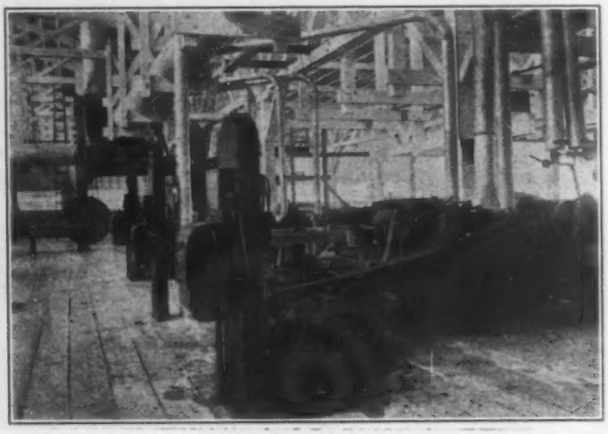
The blower system which carries shavings and sawdust from the planing mill is operated by a 200-horsepower Allis-Chalmers induction motor on which a special double extended shaft was pressed and which operates fan blades on each side of the motor.

The distribution panels supplying power to the planing mill are equipped throughout with Economy renewable fuses. The entire equipment, with the exception of the fuses, was supplied by the Allis-Chalmers Company.

Extensive Improvements —

The mill will be equipped with a modern lighting system this fall. The company will rewire the town of Port Gamble, and many of the houses now without electricity will be equipped with lights and modern appliances.

Old direct current motors will be taken out and disposed of and a few small motors in the hotel, operating pumps, ice machines, etc., will be taken out and replaced with alternating current motors.



Installation of motors and starters on planers. There are six large planers with 50 to 75-hp. motors.

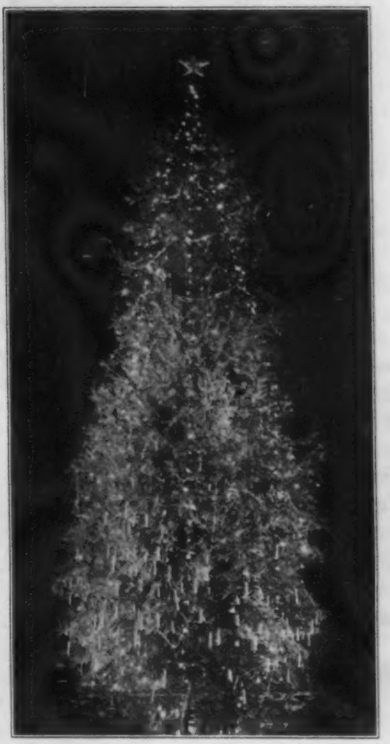
The Standard Electric Company have had entire charge of the construction work in this plant.

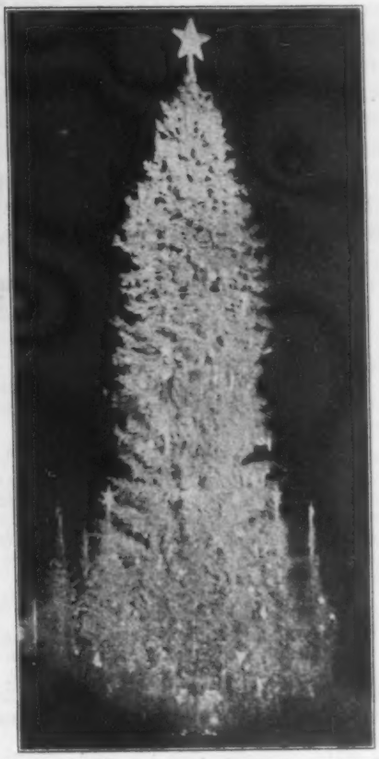
Electricity Contributes to

A BEAUTIFUL MUNICIPAL CHRISTMAS TREE AT SAN DIEGO
WITH A FAIRY-LIKE EFFECT OBTAINED BY
ELECTRICAL ILLUMINATION

the Community Christmas

No city's Christmas is complete without its community Christmas tree. The fine municipal trees here shown owe much of their decorative beauty to the varied effects obtainable by electric lighting, the other adornments playing a minor part in the scheme. The use of colored globes of different degrees of opacity gives all the variation in lighting that could be desired. The addition of small sparkling objects to refract the light is all that is required to produce effects just as remarkable as could be obtained from a far more expensive and elaborate scheme in which the electrical illumination played a less important part.





The 150-ft. San Francisco tree in the center is not a single tree as it appears but is built up on a tall flagpole. The star at the top is at the point of the pole. The decorations consist of slim rolls of white paper, giving an excellent illusion of candles, coiled shreds of tin which make small shining spirals, and a number of the colored glass gems from the Tower of Jewels of the Panama-Pacific Exposition. It can easily be seen that decorations of this kind are comparatively inexpensive, though the result was effective out of all proportion to the expenditure. The credit for the very graceful tree at the right goes to the city of Portland, Ore.

Do It Electrically, Santa Claus!

(What are you doing for Christmas? It is prophesied that this year will see a bigger sale of electrical Christmas gifts than has ever been known before, and manufacturers all over the country are making special holiday plans. Below are some of the ideas of the Western Electric Company of San Francisco.—The Editor.)

Besides the usual stuffers for envelopes, window displays, counter stands, and other details that, carefully used, merge imperceptibly into a well-conducted campaign, the Western Electric Company offers various new holiday features in recognition of the enormous demand for household appliances, a demand which it has preached for several years and which it has done a great deal to foster.

One of the new features is a 32-page booklet, entitled "Sales Promotion Service — The Value of Power Is in Its Acquirement," the sheets being 11 by 14 inches in size and containing spaces for samples of the various kinds of advertising matter on household appliances issued by the Western Electric Company, together with a brief description of the devices themselves. Thus the book becomes a valuable counter-reference as well as an advertising order book. The book is divided into sections under the heads of various devices, such as Western Electric Washing Machines, Western Electric Vacuum Cleaners, and the like, and under each section is a sample of each stuffer, pamphlet, display card, lantern slide, and window display, arranged by code numbers so as to facilitate ordering.

Another device is a specially designed letterhead and envelope showing several unhackneyed pictures of appliances in service. These letterheads will be furnished at a nominal cost to dealers, and if necessary will bear a multigraphed circular letter prepared by the local office of the Western Electric Company, or by the dealer if he prefers, or by a combination of the ideas of either.

There is also a series of crisp circular letters which are designed to catch the eye at the outset, and maintain the interest up to and including the paragraphs describing the devices. Here are a few of the introductory paragraphs of the letters:

I

When Rip Van Winkle descended from the Catskills after his sweet sleep of twenty years, he found that his mind as well as his joints had grown rusty and that everything seemed unreal and strange.

It would take just one-twentieth as long to put him out of date in this Age of Electricity, so rapidly does change follow change, and each invention makes electricity more indispensable. "What is a dry year?" inquires the farmer who owns an electrical pumping plant. "Who said drudgery?" asks the housewife who cooks, irons, washes, sews, sweeps, and washes dishes by electricity.

II

On Christmas Eve, 1914, English and German soldiers crept out from their dugouts and trenches to meet on No-Man's-Land, where they fraternized for a few hours and smoked and sang together like jovial friends. Bombs, bayonets and shrapnel could not daunt these men. They surrendered to the spirit of Christmas.

For Christmas will always represent a season of good cheer, and of giving. It is only the character of the gifts that is changed. Foolish, flimsy trifles are banned; useful, more serious presents are the rule. You can see by the suggestions enclosed that they can be artistic, too.

III

Morse invented the telegraph in 1844, Bell the telephone in 1878; the first long distance transmission line was placed in operation in 1901. That is electrical HISTORY, but the modern commercial electrical business in which we are engaged is younger than the century—it is under draft age.

IV

The cook-lady and her adventures enroute to Lonesomehurst, have always been good for a laugh anywhere, but the joke is on us when employment agencies rate her and washer-women at $2.00 to $2.50 per day plus car fare and meals. No wonder the housewives are paying REAL attention to ranges, vacuum cleaners, washing machines, who never talk back and pay their own way.

In brief, the Western Electric Washing Machine will wash efficiently; with proper care will last a life time and save the cost of a whole harem-full of servants.

Remember, the public is going to buy washing machines whether you sell them or not. The question is, are YOU going to jingle this money in your own pockets, or let it get away to total strangers?

One other special feature of this advertising is the use of a new paster, size about 3¼ by 6 inches, and gummed at the left hand side. This paster may be used in many novel ways, or it may be attached to statements, bills, or even packages or doorsteps if necessary. When attached to a package, each bundle becomes a traveling ad for the dealer, for there is a space on each paster for the dealer's name, address, telephone number and whatever legend or slogan he chooses to adopt.

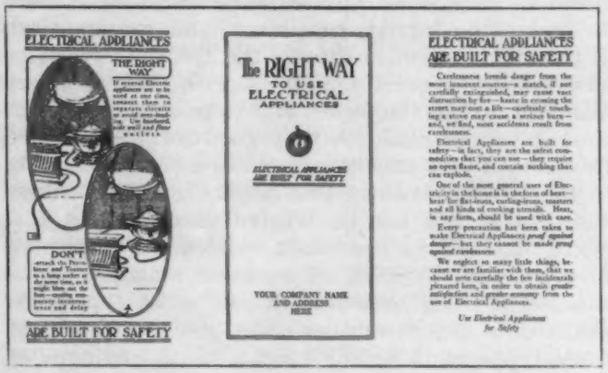
This specially designed letterhead and envelope, in pale blue, has been prepared by the Western Electric Company as one of its holiday plans for promoting the sale of electrical appliances during the Christmas season.

Potential Publicity

BY S. M. KENNEDY

(In the first part of this article, appearing in our last issue, the author dealt with specialized newspaper advertising. Below he takes up the more general forms of advertising—billboards, electric signs and motion pictures—together with the preparation of advertising copy. This concludes the third article of this series by the general agent of the Southern California Edison Company.—The Editor.)

There is a class of advertising which is not designed to have a direct selling quality, and which is intended to educate the public into greater use of electricity and give information concerning the advantages of high grade electric service. Such advertising to be effective, should make definite statements and not deal in platitudes. For educating the public to appreciate better lighting service, there are many arguments, among them the greater efficiency



A great deal of the advertising done by electrical concerns at the present time is directed not so much towards immediate sales as towards the general education of the people in the use of electricity.

of new types of lamps and their placements so as to produce the greatest amount of illumination for the smallest expenditure of current. In advertising power service, such definite arguments as the advantages of the individual drive as against line shafting friction, is illustrative. It is well to announce that the company's illuminating engineers and power experts are always available to take up with consumers the details of their individual problems. In advertising the advantages of electrical appliances, the free services of demonstrators may be announced.

Simply to advertise good service, or to claim that your service is the best service, is manifestly stupid if you do not give some tangible reason for the assertion. The unsupported proclamation savors of the man who professes himself a fine fellow, but does not back it up with any demonstration or performance. There is an antique which runs something like this: "If our service is satisfactory, tell others; if not, tell us." There is no logical reason why a consumer who is forced to borrow a candle because his lights grow dim, should make a profound secret of the reason for the borrowing. It would be well for him to hand in his complaint to the trouble department of the corporation which exists to furnish him good lighting service, and if the service is usually excellent, it might be of advantage to the company if the complainant tells his neighbor that this particular trouble is the first he has had for many a day.

Being Frank with the Public

The necessity for what was termed "political advertising" has practically passed away in states where electric rates are regulated by Public Utility Commissions. Occasionally, however, there are communities where rate matters and other questions affecting utility corporations become subjects for public discussion. In such cases, it is the duty of the utility company to tell the people frankly through the medium of its newspapers, all the facts which enter into this contention, and to do so by the free use of advertising space. Emergencies of this kind are in the nature of campaigns, and should be vigorously and fearlessly conducted by the utilities. To rush into print with a kind of advertising which was formerly termed "public utility advertising" when no controversy exists is apt to "sow the wind and reap the whirlwind." A public utility advertising expert who has made a study of practically every series of the class of advertisements referred to, that have been offered utility companies during the past decade, has divided such advertising into two classes —the "boastful ad" and the "whining ad." The first kind when put under analysis simply tells you how wonderfully good the company is and is prone to provoke discussion by those who do not relish the laudation of corporations. That prolific writer, Pro Bono Publico, has a liking for basing letters to the editor upon these boastful announcements, and the company that prints them sometimes finds that it has started something where nothing exists. The whining or hard luck ad, which tells us what a miserable time the company is having to eke out an existence, is not cheerful reading matter or encouraging to stockholders, and its psychology is to produce sarcastic comments. The farmer is beset with weevil in the wheat, the orchardist with the scale, and the merchants who have troubles of their own

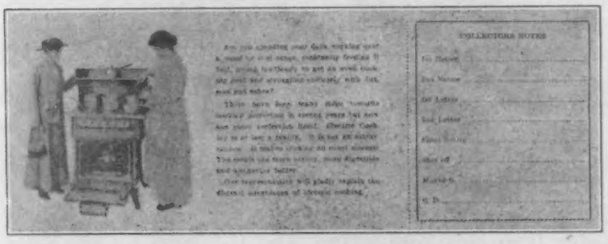
THE EASY WAY
A representative of this Company will call upon you within the next few days to tell you of something which we have to offer - and which you really need. LOOK FOR HIM. Maybe you are in a hurry, if so telephone.
Southern California Edison Co.

This clear-cut advertising card announcing the company's representative, arouses the interest of the housewife and prepares the way for the electrical salesman.

are prone to remark that if the public utility man does not like this avocation, let him go into the balloon business.

Electric Signs and Billboards

Electric signs are the latest, and without question the best method of what can be termed stimulative advertising—the class of advertising which by brief, concise statements emphasizes a fact, and often induces the reading of the more elaborate an-



Advertising on the backs of bills, if judiciously used, carries a useful message to a selected list of persons who are already users of electricity. The cost of this kind of advertising is very small.

nouncements in the advertising pages of the newspaper. The electric sign writes its story on the night and is seen where printed signs would never be noticed. One of these signs, which originated in Los Angeles, flashes a slogan which tells the story of electrical advertising. It has since glowed on the Palisades on the Hudson overlooking greater New York, has been used in many large cities, and illustrated in a well-known advertising magazine. It reads, "Night Signs Bring Day Business." The central station has a direct interest in stimulating the use of electric signs—and in this respect should be a good patron of its own product. An electric company can well afford to use electric signs on its stations, sub-stations, garages, warehouses and all its offices, and such use will stimulate others in a community to do likewise.

Billboards are very effective for stimulative advertising and much more so if electrically illuminated. The newest uses to which they are now devoted is to call attention to advertisements which are to appear in the issue of the daily or Sunday newspaper. They should contain but a few words, and these must be so largely displayed that they can be read from across the street, or by those riding in passing street cars. If they are typed too small they are worthless. Street car advertising is an excellent means of communicating brief, pungent statements. People have plenty of time while they are riding in street cars to read the advertising cards and they usually do so. Such advertising is sometimes productive of surprising results.

Using the Backs of Bills

Advertising on the backs of electrical bills may not be considered high grade publicity, but is useful for certain promotion work. The cost, however, is almost infinitesimal in proportion to the large distribution, and may be considered an advertising by-product which should be conserved and put to the best possible use, by carefully preparing the copy. This method of reaching consumers should not be overlooked or wasted any more than are the coal-tar or lamp-black utilized as by-products of a gas plant, or residuum at an oil refinery. Theatre programs have merits as auxiliary advertising, but they must be regarded the same as church catalogs, hotel register advertising and that entire class of publicity which reaches only a very limited number of people —and simply touches spots in a community. To use an electric metaphor, it has a low load factor and it bears the same relation to a comprehensive advertising plan as the massed cluster lights did to modern street and highway illumination.

Advertising Copy

In the preparation of advertising copy, the first consideration is to make a strong, forceful announcement, typed in sufficient size to catch the eye. To visualize an advertisement, it should be prepared so that the words which are used to impress will stand out in bold type. The connective lines can be cut down to very small type as they are merely there to make the legend consistent and grammatical. If the main statement catches the eye, the advertiser can consume a great deal of space in type no larger than the text of the paper, and be practically certain that it will be read. A very good form is to place these small text announcements in a one-column box in the advertisement. The displaying of an advertisement should not be trusted to dashing a few pencil marks under the words which are to be printed in big type. Type is all made in standard sizes, the height being measured in points. A type-book, available at any newspaper office, gives specimens of these types, showing the height, width and number of letters that can be made to fit into a column line.

Advertising copy needs the most careful preparation, with a forceful announcement or picture to catch the eye, and the supplementary details in smaller type. It is worth while to spend a great deal of time in preparing an effective advertising card.

By taking one of these books, and working out the typing of an ad on the point system, the exact result desired can be produced instead of leaving the important matter of display to the chance choice of a compositor. It is usually best to type ads in one series. Breaking series gives printed matter the same look as a letter penned in the handwriting of

several persons. It implies utter ignorance of the art of printing and has a haphazard appearance. The illustration of advertising can do much to improve its effectiveness. It is a part of the business, however, on which many copy-writers go wrong, simply because they have not the necessary knowledge of the technique of reproduction and photo-engraving. Most photographers are unfamiliar with reproduction processes, and do not know how to take photographs so that they will reproduce at correct angles and proper perspectives.

The central station manager must not overlook the value of folders, circulars and follow-up letters. These are all effective for special educational and promotion purposes. The fact that they may be mailed to selected lists of prospects or consumers ensures their getting into the hands of those who are likely to be interested, and because of this, satisfactory results may be reasonably expected.

The Possibilities of the Motion Picture

Motion picture or film advertising is destined to become a great factor in publicity. It has possibilities of being educational in the highest sense and its scope seems sufficient to include all of the other classes that have been touched upon. But as yet it has not been worked out or reduced to anything having a semblance of system. The obstacles which stand in the way of its general use are these: Large moving picture houses that run five-reel features, and short comedy, and are now supplementing the entertainment with vaudeville and musical attractions, are cutting out the travelogue and educational pictures, and will not use any film that has even an indirect advertising announcement. The neighborhood and rural picture houses will accept educational films with a small amount of advertising included, and if the picture is good many of them will present it without any charge. It would be necessary to run a film through all of the neighborhood and rural theatres in a community in order to give it a general publicity value, and this cannot be accomplished under any of the present releasing arrangements. It therefore follows that money expended for a film without some system of having it displayed, is more or less of a venture. Whether or not the electrical industry can evolve some particular method of film production which will take it out of the class of small spot advertising is an interesting problem, and worthy of careful thought. The cost of producing one negative of a commercial film ranges from one dollar per foot up. Exteriors such as power plants, hydraulic installations and out-door lighting effects cost the camera man's time and the price of the film, including its development. In some respects the moving picture, as an advertising medium, has no equal and there is no business that can use it to greater advantage than the electrical industry. The electrical business is essentially active and aggressive—it spells activity in all its uses. The motion picture can represent action better than any other advertising means—it is activity personified and is destined to become one of the great mediums for telling the electric story of ease, comfort, economy, health and hope for all.

Each type of advertising which has been referred to must be sincerely honest, and have proof for its underlying principle. Fake advertising is always a boomerang. It pays to advertise only when the advertising is truthful, for "above all things truth beareth away the victory."

Advertising and Development

The well operated central station company makes an advertising appropriation at the beginning of each year. Of the total appropriation, experience has indicated that approximately seventy-five per cent can well be spent in newspaper advertising, and the remainder distributed among the other mediums and methods mentioned. The amount of this appropriation depends upon the amount of intensive or extensive developments desired—and this development often depends upon the funds available for additions to plants and extensions to distributing systems. Intensive development does not require the additions to capital expenditure that are required by extensive development. Intensive development represents greater earning from present investment—and as a means to this end, nothing produces more direct results than the timely use of carefully prepared advertisements, followed up with personal interviews. To the central station company advertising may be made as effective as in any commercial enterprise. Stereotyped, unproductive advertising should be eliminated without loss of time, and the money heretofore wasted in this manner should be invested in such known methods of publicity that will produce satisfactory results.

$50.00
FOR A NAME
We are about to open an Electric Store at
133 Tenth, Near Alder
and want a suitable name for it. Fill out the following blank and mail it in.
FURTHER
We will allow any one who turns in a name a $5.00 credit slip on any Washing Machine, Vacuum Cleaner, Mangle or other appliance which we handle listing $50.00 or over if purchased within 30 days from date.
SHOULD THERE BE MORE THAN ONE
send in the name which we select the $50.00 will be divided. All replies must be in by 6:00 P. M. October 29.
Store name.....
Your name.....
Address .....
Mail Answers
133 Tenth, Near Alder
Store Opens October 30th

The above announcement heralded the opening of a retail store by Geo. A. Humler, for several years Portland representative of the Edison Lamp Works. The winning name was "The Electric Maid," and the store is now known under that title.

Standards of Service in the Public Utility

BY JOHN D. KUSTER

(The twenty-four-hour man, the requirements and responsibilities of the public utility, and its employees, and the ideals towards which they are working, are taken up in the following excerpt from an address delivered recently before a convention of the Pacific Coast Gas Association. The author is manager of the San Jose branch of the Pacific Gas & Electric Company.—The Editor.

With the average rise in the past six years in this country of 91 per cent in the retail price of the actual food necessities of human existence, the salaried man and the wage earner have been busy in the science of high finance.

The salaried man or woman not a mechanic, and not a part of a labor organization belongs to the class of workers that is deserving of attention. If he has had an increase, it has probably not averaged more than 15 per cent, while the men under him have had increases of 50 per cent. He is the man whose shift is limited to twenty-four hours a day, and three hundred and sixty-five days a year. On duty always when needed, and sleeping with a telephone at his pillow, he carries on his shoulders the responsibilities of his company. He defends it against all criticisms and unselfishly glories in its success. He is called out nights, or holidays without a thought for overtime. He is loyal through strikes, despises dishonesty wherever he sees it, whether in the form of laziness of a worker on the job, a collector short-changing a customer, a traveling inspector padding an expense account, or a complaint man accepting a tip. Organized labor takes care of itself, but the salaried man is sadly overlooked. He has the right to an annual income that will enable him to live well, buy a home with a few acres, permit him to educate his family, and by reasonable thrift and economy lay aside enough to enable him to make a living out of his little farm when "Old Father Time" hands him the "blue envelope."

Responsibilities and Privileges —

The employees of public utilities generally, come in closer contact with the public than the employees of factories or other industries. They are required to be courteous and polite, under irritating criticism from persons unable intelligently to criticise the service, rates or operating rules of the company.

The very nature of public utility work requires strict discipline and positive accuracy and reliability. For this reason the employees of all utilities should be better paid, should work shorter hours, should be better housed and have better working conditions than those of other industries. They could then be more carefully selected and permanent employment with the utility would in itself be a certificate of character and ability that would be a valuable asset.

Whether unionized or not, they should not be denied the right of collective bargaining if they desire it, and all disputes and differences that may arise that cannot be settled by representatives of the workers and employers, should be referred to the public utility commission whose judgment should be final, and who have the authority to make rates to justify generous treatment. The public are not concerned in the disputes that arise, but they pay for a service which the utility is obliged to render, and any person accepting employment with the utilities obligates himself to assist in making that service perfect. He forfeits his right to strike, or to even absent himself temporarily from duty without knowing that a trained employee is ready to take his place.

Maintaining a Balance —

It is ridiculous for employees to feel that industries exist for them alone, and it is just as absurd for owners and bankers to think that they are the favored ones of God's realm, and that all good things were provided in order that their families may enjoy leisure and all the luxuries of an extravagant existence.

If the banker or owner works six hours a day and five days a week, counting a game of golf Wednesday afternoon, it is little wonder that his employees question why they should work ten hours a day and six days a week. If the owner takes his living out of the business each month, and a substantial dividend from the profits at the end of the year, I am not surprised that the worker yearns for a share in the year's profits, as his monthly wage has been barely a scant living. He too wants a savings account, to sustain his old age.

When a factory pays its laborers $5.00 a day, and a twenty-four-year-old boy president of the concern $125,000.00 a year, there is an inequality out of harmony with the American sense of justice. To my mind these are the biggest questions before the world today, and the very fact that owners are beginning to show a willingness to discuss them and correct them, are evidences that they will be peaceably and justly settled.

The employer and employee must both learn that each has rights which will bring greater prosperity to all if these rights are respected.

The wage earner is principally concerned in what he calls a more equal distribution of the profits. He forgets that frequently there are no profits, but he gets his wages just the same, and his employer pockets his loss and says nothing.

The Ethics of Industry —

He is concerned in shorter hours, better working conditions, accident compensation, health insurance, and safety laws, all of which the employers are beginning to accept. The one vital principle the employee has not yet learned is that careless inefficient workmanship, loafing on the job, curbing output, incomplete knowledge of the work to be performed, just "getting by on a bluff," disloyalty and indifference to his employer's interests are all forms of dishonesty, and are destructive to the prosperity

of an industry, the reputation of a public utility or the life of a nation.

The correction of this evil in adults can be accomplished only by personal reward in some form; yearly bonus for continuous service; frequent promotion; cash prizes for evidences of extraordinary skill; public acknowledgment of superior skill or talent; selection of skillful workers as instructors of those less skillful; encouragement to study at home or in night school in subjects allied with the daily work. To prevent the continuation of this fundamental error in the rising generation, we must enlist the service of the public schools. Education in its broadest sense must be compulsory and vocational, they must be taught to work with the hands, and when a boy is physically or mentally unfit for a mechanic or an agriculturist, it is time enough then to try to make a lawyer out of him, but the selection of his vocation or profession should be made by a board of vocational experts, and not by an indulgent mother or a whimsical maiden aunt.

If this nation is to compare favorably with other nations, its industrial and mechanical engineers and chemists must write into the patriotic exercises of young and old something more than singing the "Star Spangled Banner;" they must breathe into the souls of young men and women through home influence and school training, a yearning for knowledge and superior skill; discipline and obedience; an enthusiasm for thoroughness; a heroic worship for creative imagination in work to improve industry; and a realization that any vocation or trade becomes a profession whenever a worker puts a sufficient amount of knowledge, skill, enthusiasm and imagination into his work.

A public utility, monopolistic in its function, as it should be, practically guaranteed a reasonable return on its investment, seems to me to be the ideal institution for setting the standard of conduct, for both owners and workers; for character building and citizenship; for work and recreation; and for the security of the health and old age of its men and women.

Caring for the Stock

(How much delay, inconvenience and deterioration can be put down to lack of system in the storing and handling of stock? The following account of the methods of the Pacific States Electric Company describes some of the efficient and orderly devices employed in the stock-rooms to ensure the best possible service in filling orders.—The Editor.)

The first impression is often the one which determines the character of the relations which are to follow. A concern in which all details are neat and orderly is recorded in the mind of the customer as a satisfactory, business-like place with which to deal and he approaches all further transactions in this frame of mind. With this aim of a favorable first impression, the San Francisco office of the Pacific States Electric Company has worked out a detailed system of caring for a stock which often mounts up to seven and nine thousand items. Store rooms and shipping departments are as orderly as the offices and display rooms. Incidentally, this system is one which enables orders to be filled promptly and without confusion, and obviates loss of material through careless handling or deterioration on the shelves. Similar plans are carried out in each of the branch offices, although on a somewhat smaller scale.

The stock rooms on each floor are wired in a different manner and constitute virtually a wiring exhibit. The illumination of the different sections of the floor is independently controlled.

Boxed Material —

Several floors of the six-story building on Mission Street, San Francisco, are given up to storage of stock, in general the lighter materials being handled on the upper floors and heavier materials lower down. An ingenious system has been worked out for shelf storage by the use of boxes of a uniform size, on the principle of the sectional book case. These shelves run longitudinally of the building with sufficient space between to permit of the storage of boxed material in the aisles and still leave adequate room to move about. No open cases are permitted on the floor. As soon as a box is broken, its contents are removed to the shelves directly opposite. This material in turn must be wrapped. If it does not come wrapped or in boxes it is properly protected before being placed on the shelves. The mass of the stock, therefore is piled in regular order down the aisles in unopened cases, with smaller lots of the same in the shelves directly opposite.

Sectional Box Shelving —

The use of boxes has been found extremely satisfactory. Originally wire boxes were used, but more recently heavier boxes of a uniform type have been made which are used throughout the building. The average box in use is about 36 inches long by 15 inches high, but for larger materials a box of double this height is used. Where materials are very small and a bin is necessary, as in the case of screws and the like in the line of hardware, a board

nailed across the lower half of the box converts it into a convenient receptacle.

These boxes piled evenly back to back form a set of shelves facing both aisles of very neat appearance. In addition they are extremely flexible, being

The packing department is in the basement, conveniently located for the trucks. A moving wrapping platform is used to obviate the necessity of moving goods from one part of the room to another.

easily taken down or built up as needed without the necessity for calling in a carpenter. They have been found to be far more durable than shelving. Some of the boxes now in use in the San Francisco branch, in fact, were brought over from the Oakland division directly after the fire and have undoubtedly been moved several times since, but are still in perfectly sound condition.

For certain types of materials, of course, racks resembling pigeon holes are necessary and these have been painted white over their front surface to permit them to be plainly marked with sizes and other required data.

A Wiring Exhibit —

Lights are provided adequately throughout, the illumination of each small section of the floor being independently controlled in order not to waste electricity. The wiring itself is of particular interest, each floor being wired in a different manner, one with rigid conduit, another with flexible, one with knob and tube—and so on, to illustrate the various types of material from their stock as they appear in use.

Convenience in Inventory —

Materials, of course, are stored according to their type, all sockets and the like occupying one division, for instance, small household appliances another. For convenience during inventory each floor is divided into several of these sections by white lines painted on the floor, much as the divisions on a tennis court. All one type of material is stored within such an area and in taking the inventory each is cleared up in turn. This system also makes it very simple to fill an order. With a floor plan of the sections on each floor it is possible for even a green hand to locate materials without inconvenience. In fact, it is possible to mark on the order slip before it leaves the office, in just what floor and section the material will be located.

Heavy Material —

Heavy material as has been said is stored on the lower floors to save the necessity for lengthy transportation; heavy hardware, wire and the like being located in the basement where it can be delivered direct from the wagons by way of a chute. Here it is assorted and piled in convenient locations for easy

The opened packages are stored in shelves directly opposite the piles of cases from which they were taken. The shelves are made of boxes and can be easily taken down, added to or rearranged.

handling. Conduit and material of a like nature is stood on end and separated by projecting joists against which it may rest.

Handling the Stock —

Incoming material destined for the upper floors is delivered at the ground floor and stacked in a space given up for that purpose in the neighborhood of the elevator. From here it is transported by freight elevator to its proper floor where it is again stored in the location set aside for this purpose until it can be assorted and permanently placed. Outgoing matter for the filling of orders is handled largely by a smaller elevator near the center of the building.

The floor is divided into sections by white lines painted on the floor, and all one type of material is stored in one area. This greatly facilitates the taking of inventories, and makes it easy to locate any kind of goods by means of a floor plan.

Both of these elevators are automatically operated with double control which permits of their being operated without an attendant. Safety features are installed so that opening the door automatically stops the car. In operation the elevator is brought to the desired floor by pressing the button, the door being closed. The door is then opened, the elevator loaded, and the door re-closed. It may now be sent to any desired floor by pressing the proper button. At the same time, the attendant on that floor is notified by ringing a bell that the elevator is enroute. A light which flashes on notifies him a moment later of its arrival.

There is no "junk" material allowed on any of the floors. One small section is devoted to this purpose and here obsolete apparatus or damaged articles are stored until they can be repaired or something done with them.

ELECTRICITY IN LUMBER WORK

An electrically operated lumber mill at Crane Valley getting out lumber for the new construction program of the San Joaquin Light and Power Corporation now in the process of formation. The transformer bank may be discerned in the shade to the left of the big tree just behind the building. Lumber of all sizes is being made here for use throughout the territory.

An example of practical conservation and cooperation. Sawing up the slabs as they come from the sawmill into sizes for use as stove wood. Huge piles may be seen on the dump in the background. The company employes, campers and residents in the locality and the Indians are permitted to make use of this waste wood in their homes.

FORESTRY WITH THE A. E. F.

(The following interesting account of some of the activities of the Forestry Section with the American army in France is extracted from the official report of the Director of Construction and Forestry, and is obtained through Lieut.-Colonel W. B. Greeley who served as chief of the Forestry Section, directly under the Director.—The Editor.)

The lack of ocean transport made it necessary to obtain practically all the lumber and other forest products required by the American Expeditionary Forces from French and other European sources. Shipments of such bulky material from the United States was restricted to a small quantity of piling and dock timbers used chiefly in the Bassens dock. Furthermore, the shortage of forest products in France and the heavy requirements of the French and British Armies made it necessary for the A. E. F. to be self-sustaining in the supply of these essential materials, which were called for in enormous and steadily increasing quantities. The current monthly requirements of the Army at the time of the Armistice totaled 50,000,000 board feet of lumber and timbers, 250,000 railroad ties, 6,500 pieces of piling and cribbing, 1,500,000 poles and entanglement stakes, and something over 100,000 cords of fuel wood.

Lumber production was begun in December, 1917, by the 10th Engineers (Forestry) which operated two American and four French mills during that month and cut 321,000 feet of lumber, 205 piles, 12,000 ties, 20,000 poles, and 1,200 cords of fuel wood. During the winter and spring of 1918, the forestry troops were augmented. Thirty-four mills were operated in March, 1918, and 59 mills in June. At the time of the Armistice, 90 operations, including 81 sawmills, were in progress, employing nearly 12,000 technical engineer troops and 8,500 service troops.

The earliest operations of the Forestry Section were undertaken in the Landes pineries of Base Section No. 2, where there was an early demand for piling, warehouse lumber, and railroad ties; in the Loire River Valley near the lines of communication and the large depots and construction projects in Central France, and in the softwood forests of the Vosges and Jura Mountains and the hardwood areas immediately behind the American sector of the front.

The forestry operations at the time of the Armistice were grouped in fourteen operating districts, each under a Battalion Commander and organized as far as practicable to function as a self-contained unit. In addition, eight operating units with portable sawmills were attached to the First and Second Armies, working near Engineer dumps and supplying them with the forest products most urgently needed from time to time.

Up until March 1, the Forestry Section produced approximately 206 million feet of lumber, 3 million standard gauge ties, 1 million small ties, 39,000 piles, and 1,800,000 poles and entanglement stakes, for the A. E. F. In addition to these amounts, approximately 10,000,000 feet of lumber and 440,000 standard ties were cut by two forestry battalions

which were loaned to the French and British Armies. All told, the Forestry Section up to the same date supplied 400,000 cords of fuel wood to the army.

To maintain this enormous production, it was necessary to scout practically all of France south of the Northern Provinces for suitable timber and to negotiate its purchase through French channels.

On account of the delay in the arrival of American equipment, eight stationary French sawmills were leased or requisitioned in the fall and winter of 1917 and twelve portable French mills were acquired. This equipment aided greatly in meeting the acute shortage of lumber. The French plants were largely remodeled by the forestry troops and their production doubled or trebled. Their capacity was still so limited, however, that they were discarded as rapidly as American mills could be obtained.

Three types of American sawmills were employed:

(1) A heavy-powered, permanent steam plant, rated to cut 20,000 board feet in 10 hours.

(2) A moderately powered, portable type of steam sawmill, rated to cut 10,000 board feet in 10 hours.

(3) A very light, portable "bolter mill," run either by steam or by gas tractor, rated to cut 5,000 board feet in 10 hours and especially suited to light products like railroad ties.

Twenty of the large mills were installed at points where the supply of timber permitted their operation for eight months or longer. The other mills were well adapted to the many small wood-lots in France which it was necessary to utilize. In the face of a critical shortage of lumber, every possible effort was made to speed up production. Practically all sawmills were operated day and night shifts and some of them three 8-hour shifts. More than double the rated capacity of the plants was obtained currently by most of the forestry operations. Upwards of 150,000 feet of lumber were cut in twenty hours at several of the large mills whose rated capacity for the same period was 40,000 feet. Cuts as high as 66,000 feet of railroad ties were made in 20 hours on the little bolter mills. All of the large and many of the small mills were steamed successfully by means of dutch ovens for burning sawdust, designated and installed on the ground by the forestry millwrights. An enormous quantity of fuel wood was saved by this means.

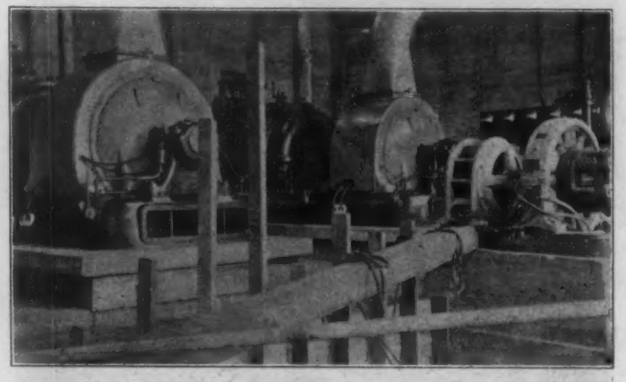
Standard or meter gauge railroad installations, up to three miles in length, were necessary at two-thirds of the mills to give them direct rail connections and provide adequate facilities for loading cars. Light railroads of 3-foot, meter, or 60-centimeter gauge, with steam or gas locomotives or horse-drawn trams, were used for logging at many operations. A difficult area in the Vosges Mountains was logged by means of a 4,000 foot meter gauge incline, with an average grade of 35 per cent, down which carloads of logs were lowered by donkey engine and cable. Much of the logging was done by horses with log wagons, spool carts, or high wheels. The excellent French roads were used extensively for bringing in logs by motor trucks and by tractors drawing slow-speed trailers or log-wagons. 100-foot piles were hauled by this means for distances up to 15 kilometers.

One of the noteworthy accomplishments of the Forestry Section was the cutting and logging of 15,000 piles from 65 to 100 feet in length, under great difficulties, which assured the completion of the major dock projects at the A. E. F. base ports. Approximately 15,000,000 feet of long, heavy timbers, requiring special selection and manufacture, were also furnished for dock, barge and bridge construction. By an active field organization, it was possible to keep the current rail and cargo deliveries of lumber, ties and piling up to 75 per cent in spite of the shortage of transportation facilities in France.

ELECTRICITY IN A MILLING PLANT

(Development in industrial plants is now almost universally characterized by a change to electric drive, or by important electrical installations such as the new generating plant described below.—The Editor.)

A new generating plant has recently been completed at Atchison, Kansas, for the Blair Milling

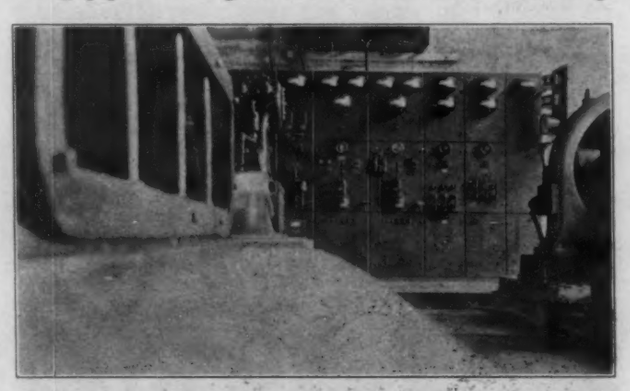


The main generators are 750-kw. each and have a speed of 1800 r.p.m., generating at 2300 volts. The exciters are shown at the right.

Company. The power supply is to be used for operating the motors throughout the mill, which has complete electrical equipment.

Enclosed Generators —

The generators are entirely enclosed, with ventilating pipes leading to the exterior of the building.



Switchboard and meters in the generating plant of the Blair Milling Company at Atchison

The cooling air is admitted from the basement through proper openings in the floor.

Exciters —

In the foreground of the illustration showing the turbines are located the pump pits, while at the

right are the exciters. The smaller unit is a 50-kw. General Electric machine, used for exciting purposes only. The machine at the right is a Western Electric 50-kw., d.c. generator, so connected that it can be used for lighting as well as for exciting the main generators.

Main Generators —

The main generators are 750-kw. each, and have a speed of 1800 r.p.m. generating at 2300 volts. They are driven by direct connected Curtis steam turbines. The a.c. motors in the mill total over 1000 h.p., consisting of 1—250-hp., 1—200-hp., 1—150-hp., 2—75-hp. and numerous smaller units. The d.c. motors total about 130 hp., varying in size up to 40 hp. The average load will probably be about 800 kw.

The Boiler Room —

The boiler room of the plant is designed to reduce the labor as much as possible. There are 4 B. & W. boilers and two Atlas boilers, all equipped with Rosey stokers. Coal conveyors and bunkers are provided, and the ash handling is entirely automatic.

Cooperation as a Bankable Asset

BY C. W. BANTA

(Promotion, sales, advertising, financing—each part of a business is linked with every other and none can function successfully except in harmony with the rest. This spirit of concerted action, and the attitude of the banks towards the business which demonstrates it, is here discussed by the assistant cashier of the Wells Fargo Nevada National Bank in the last of a series of articles on cooperation.—The Editor.)

Recently, the factory superintendent of a large eastern corporation came to San Francisco to find a location and to prepare plans for a Pacific Coast branch factory. He bore a letter of introduction to the bank and came to see me.

In the course of conversation, I asked him what his Company intended to do.

He gave me an interesting description of the kind of property he must find, of the appearance of the factory when completed. He spoke at length of the machinery that should be installed, of the product and the method of manufacture that would be used in its output.

When he left, I had a clear picture of that Company. It needed nothing to complete my appreciation.

The Individual Viewpoints —

About three weeks later, their sales manager visited the Company's jobbers upon the Pacific Coast. He also came in to see me.

We talked of mutual friends in the trade and of the position of the Company's line—of its growing importance—of its market here and last, but not least, we talked of his competitors' sales practices. And, again, I had a perfect picture of what might have been a complete business in itself.

Within two months, the Treasurer visited us. He spoke of the Company's finances, of its banking accounts, of the funds that it would need, of the costs in the transfer by telegraph and by mail of funds from the various Pacific Coast cities to eastern centers. He discussed our ability to cooperate in credit investigations and mentioned various other matters that came within the scope of his activities. Again, a complete picture.

After these men had returned to the East and made their various reports, the President of that great corporation came out here.

Working Together —

It was not until after his conversation that I realized the absolute **independence of each of these various factors in the business**—and yet, with all, of their utter **dependence, one upon the other** for cooperation.

The President spoke of the source of the raw materials for their factory, of the labor that would have to be found and employed to operate the factory, of the factory itself, of the overhead expense of running the factory, the amount of sales in the territory, the overhead expense of the sales force, of the general office force necessary in the conduct of his business here. He discussed transportation problems, collection problems, and he went the sales manager one better and inquired regarding conditions in foreign ports bordering upon the Pacific Ocean and I had the opportunity of suggesting that part of the export department be transferred from New York to San Francisco.

In bringing out the various factors which make for success in business I have tried to present—

The absolute independence of each unit in its full action.

Yet, the utter dependence of each unit upon the others in achieving success for any unit.

That this dependence is cooperation—that it is not made by material things—but of Mental, Moral, Ethical, Spiritual ideals.

That ability of each to visualize the future, to enact a plan or policy which will bring the entire group in that business, without stragglers, to the point of realization of present hopes of future success and of business happiness.

An Example of Cooperation —

I want to tell you of the greatest single example of cooperation that I have ever seen.

Recently, during a storm at sea, a great flock of geese were winging their way southward into the teeth of the gale. They flew close to the water—swiftly—heads flat—necks straight—every bird of them straining against the wind.

They flew in the formation of a great capital "V" with the sharp point toward the south.

I glanced at the birds down the left side of the "V." The second bird was sheltered slightly—the wind pressure against his right wing being broken by the passage of the leader through the air.

The third bird in line, undoubtedly, had less wind resistance, for the other birds were shielding him.

As I looked down the long stretch of birds, I said to myself, "What wonderful cooperation!"

Then I glanced back to look for stragglers, but there were none. I noticed that the ends of the "V" were bent slightly in—like the prongs of a wishbone.

The third bird from the end drew my attention. He had missed a flap of his wings—he was sailing—often he would rest on the wind. He was tired! Others around were more worn out than he—but strange to say, they made as good speed as the leader—But—how?

I do not know their habits, but I like to think that each bore the brunt as leader—that the position of each in the line attested to the strength of the individual at that time, and that those that were resting in the air pockets and eddies behind the sharp point of the "V" had already given of their best strength to the flock and were still eager to take their place again on the front of the line.

At all events, I feel sure the strongest faced the wind and that the weaker were under the protection of the strong and that all arrived together at their happy destination quicker and more safely than could any one of them, had he battled the elements alone.

California Electrical Co-operative Campaign

An Educational Campaign in Which the Various Electrical Interests Co-operate to Improve the Industry's Service to the People

(Among the recent activities of the California Electrical Cooperative Campaign the idea of the "electrical page" in the newspapers is making great headway. The extensive list of stores which have made important improvements gives some idea of the tangible results which the Campaign is accomplishing in the merchandising field.—The Editor.)

REPORT OF ADVISORY COMMITTEE FOR MONTH OF SEPTEMBER

An Electrical Page —

At the present time the Advisory Committee is making a determined effort to build up in every newspaper of importance in California an electrical page for the purpose of getting the "do-it-electrically" idea before the public through advertisements and reading matter. The Secretary recently devoted three weeks to starting this campaign in the southern part of the state. He presented the subject to the central stations, manufacturers, jobbers and contractor-dealers; in all five hundred persons, representing the territory south of the Tehachapi. All expressed themselves as desirous of seeing an electrical page established and of doing their part to bring it about. He also called on twenty of the larger newspapers whose advertising managers promised to do all they could to secure electrical pages through solicitation.

The Los Angeles Gas and Electric Company will start an advertising campaign in three of the Los Angeles newspapers and will run one advertisement a week on electrical appliances, of approximately four by ten inches, around which the dealers can group their advertisements. The Southern California Edison Company has made a special appropriation of $2,000.00 for November and December to use in building up these pages in their territory outside of the city of Los Angeles. The Southern Sierras Power Company has agreed to use all of its advertising space for the purpose of starting electrical pages in its territory. This is viewed by the Advisory Committee as increased subscriptions from these corporations for the purpose of promulgating the cause represented by the California Electrical Cooperative Campaign and is gratifying.

The jobbers responded in excellent fashion. They promised to see that the copy of the contractor-dealers was of the highest quality and some intimated that they would aid financially the contractor-dealer in his advertising efforts. The contractor-dealers themselves readily accepted the idea of an electrical page and promised to run advertisements of their own to tie-in to the central station advertisements.

In San Francisco the Bulletin is endeavoring to develop an electrical page. The Pacific Gas & Electric Company has agreed to run in that newspaper one advertisement a week around which the dealers can build their advertisements. Electrical pages are now appearing in Bakersfield and Fresno.

Major Improvements —

A careful checking by the field representatives results in the following report on major improvements among the contractor-dealers since the California Electrical Cooperative Campaign began, or in a year and a half.

New stores, 50; stores that moved into a better location, 65; stores that have made major improvements, 43; total, 158. Number of solicitors employed at present, 123.

The new stores represent contractors who have developed into contractor-dealers and former solicitors of central stations and salesmen of jobbers and manufacturers who have opened electrical stores of their own. The expansion has been within the industry. By major improvements is meant alterations that have resulted in a complete change and remodeling of the store for the better. No notation is made of the number of stores that have made minor improvements such as window displays, installation of lamp racks, new show cases and the like, because every store in California shows some improvement. Of 123 solicitors employed, twenty-five spend one-half of their time in the store and one-half in outside soliciting. This improvement we believe worthy of the attention of our contributors.

Following are lists of the stores and improvements referred to:

MOVED INTO NEW LOCATION —

Territory of Curt C. Davis.—Electric Motor & Machine Co., M. C. Baker & Son, Inc., Byington Electric Co., Electrical Products Sales Co., Hampton Electric & Machine Co., Liberty Electric Co., and A. F. Wells, all of San Francisco; Andrews Electric Co., and Spotts Bros., Oakland; Bogles Electrical Works, San Rafael; San Jose Electric Co., San Jose; J. A. Foster, San Mateo; Strom Electrical Co., Alameda; Concord Hardware & Plumbing, Concord.

Territory of W. F. Brainerd.—Sacramento Appliance Co., and The Electric Shop, Sacramento; Gould the Light Man, Commercial Electric Co., and Electrical Engineering & Manufacturing Co., Stockton; Chas. Eyeman, Madera; Fresno Electric Co., Fresno; E. M. M. Service, Lindsay; Star Electric Co., Bakersfield; R. A. Rounsaville, Tulare; E. B. Anderson, Coalinga; E. P. Greenep, Hollister; Bauer & Baugh, Petaluma; G. A. Dohlmaier, Oroville; Western Gas & Electric Appliance. and W. S. Cass, Chico; W. F. Blide, Santa Cruz; The Motor Shop, Fresno.

Territory of A. L. Spring.—Bluebird Electric Appliance Shop, Campbell Electrical Shop, F. A. Clarke Co., Gans Bros. (No. 1), Chas. A. Holland, Hosking Electric Co., King Electric Co., West End Electric Co. (No. 1 and No. 2), and A. A. Wilson, all of Los Angeles; Akin Plumbing & Electrical Shop, Brawley; Winder & Jones, Covina; Strawn Electric Co., El Centro; Fillmore Electrical Shop, Fillmore; Ankrum Electrical Shop, Hemet; R. D. Aylesworth, Inglewood; Chas. Bean, La Verne; Lewis Electric Co., Long Beach; Marsh Electric Co., Long Beach; J. G. Robertson Electric Co., Orange; J. L. Mitchell, Oxnard; A. P. Gaylord, W. A. McNally & Co., and L. E. Taylor, Pasadena; Independent Electric Co., Redlands; Riverside Electric Co., Riverside; Burton Electric Co., and Whenn Electric Co., San Diego; Fred A. Downer & Co., and Nielson-Smith Electric Co., Santa Barbara; H. N. Snyder, Santa Paula; Torrance Electric Shop, Torrance.

MAJOR IMPROVEMENTS—REMODELED STORE —

Territory of C. C. Davis.—Abben Electric Works, Emporium, Haller Cunningham, Ickelheimer Bros. Co., and Roberts Manufacturing Co., San Francisco; Bird-Rymer, Oakland; Pacific Electric & Manufacturing Co., Richmond; Century Electric Co., and Garden City Electric Co., San Jose; Levy Bros., San Mateo; University Electric Co., Palo Alto; San Jose Electric Co., San Jose; Kohlway-Smith-Alfs Electric Co., San Francisco; Electrical Shop, Martinez.

Territory of W. F. Brainerd.—Lewis Electric Co., Central State Electric Co., and Valley Electric Co., Fresno; J. M. Nightingale, Modesto; C. E. Osborn, Turlock; The Electric Shop, San Luis Obispo; Harrington Lentz, Modesto; University Electric Co., Palo Alto; Solano Electrical Supply Co., Suisun; Kern Valley Electric Co., Bakersfield.

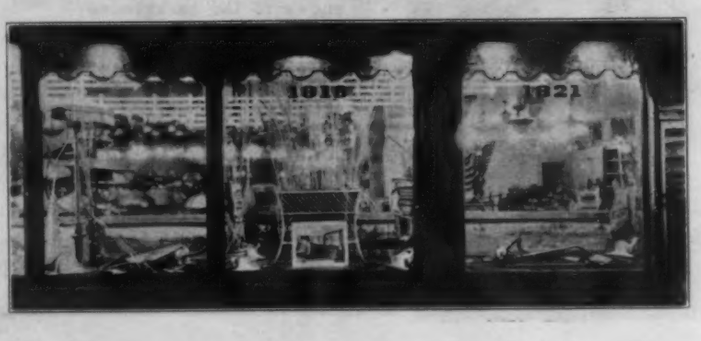
Territory of A. L. Spring.—Bluebird Electric Appliance Shop, Gans Brothers (No. 2), Gas & Electric Appliance Co., Llewellyn's Electrical Shop, and Woodill-Hulse Electric Co., Los Angeles; Reid-Farley Electric Co., Fullerton; J. A. Newton, Glendale; Moran & McWhinnie, Hermosa Beach; J. W. Lane, and Lantz Electric Co., Long Beach; Granger-Hall Electric Co., Ontario; H. L. Miller, Pasadena; Field Electrical Co., San Bernardino; Hartwell Electric Co., San Diego; Green's Electrical Store, San Pedro; Cope Electric Co., and J. G. Robertson Electric Co., Santa Ana; Fred A. Downer & Co., Santa Barbara; Smith Plumbing & Electric Co., Van Nuys.

USING SOLICITORS —

Territory of Curt C. Davis.—Byington Electric Co., San Francisco, 1; Holterman's Electrical Shop, San Francisco, 1; Home Electrical, San Francisco, 1; Levy Electric Co., San Francisco, 2; Bird-Rymer, Oakland, 1; L. H. Bullock, Oakland, 2; Domestic Electrical Appliance Co., Oakland, 1; Kimball Electric Co., Oakland, 7; Piedmont Electric Co., Piedmont, 1; H. C. & B. C. Walker, Oakland, 1; Pioneer Electric Co., Richmond, 1; Wagner Bros., San Jose, 1; Garden City Electric Co., San Jose, 1; J. A. Foster, San Mateo, 1; Spott Bros., Oakland, 1; Hartley Hardware Co., Mountain View, 1; Century Electric Co., San Jose, 1; San Jose Electric Co., San Jose, 1; Watts Electric Co., San Francisco, 1; Advance Electric Co., Oakland, 1.

Territory of W. F. Brainerd.—Oscar Abbott, Hanford, 1; Harry Crow, Tulare, 1; R. A. Rounsaville, Tulare, 1; Robt. Tschenney, Visalia, 1; Chaffee Electrical Shop, Visalia, 1; E. M. M. Service, Lindsay, 1; Central California Electric Co., Lindsay, 1; A. R. Parsons, Porterville, 1; Umler Machinery Co., Porterville, 1; J. M. Nightingale, Modesto, 1; Cox Bros., Santa Cruz, and Salinas Electrical Works, Salinas, 1 co-op.; J. C. Hobrecht, Sacramento, 3; Sacramento Appliance Co., Sacramento, 6; Wallace & Smith (Sacramento), 1, (Stockton) 1; Western Gas & Electric Appliance Co., Chico, 1; Earl Wilson, Napa, 1; Valley Electrical Supply Co., Fresno, 7; Henry Berg, Marysville, 1; Noggle Electric Works, Monterey, Central Electric Works, Watsonville, E. P. Greenep, Hollister, and Hollenbeck Electrical Works, Gilroy, 1 cooperatively.

Territory of A. L. Spring.—W. C. Bailess, Los Angeles, 1; Beacon Light Co., Los Angeles, 1; Bluebird Electric Appliance Shop, Los Angeles, 3; William J. Burk, Los Angeles, 1; F. A. Clarke, Los Angeles, 7; Electric Lighting Supply Co., Los Angeles, 1; Gas & Electric Appliance Co., Los Angeles, 2; Foulkes Electrical Shop, Los Angeles, 1; Golden State Electric Co., Los Angeles, 1; F. E. Newberry Electric Co., Los Angeles, 22; Southern California Electrical Co., Los Angeles, 3; Winder & Jones, Covina, 1; Reid-Farley, Fullerton, 1; J. A. Newton Electric Co., Glendale, 1; Lantz Electric Co., Long Beach, 1; Pomona Fixture & Wiring Co., Pomona, 1; H. L. Miller Co., Pasadena, 2; Sanders Electrical Shop, Pasadena, 1; L. C. Taylor, Pasadena, 1; Granger-Hall Electric Co., Ontario, 1; Snyder & Bell, San Bernardino, 1; Field Electrical Co., San Bernardino, 1; Burton Electric Co., San Diego, 1; Hartwell Electric Co., San Diego, 1; R. L. Jennings, San Diego, 1; Southern Electrical Co., San Diego, 2; San Pedro Electric Co., San Pedro, 1; Coast Electric & Machinery Co., Venice, 1; Smith Plumbing & Electric Co., Van Nuys, 1; Geo. S. Funk & Son, Redondo, Moran & McWhinnie, Hermosa, Gardena Electrical Shop, Gardena, Torrance Electrical Shop, Torrance, and R. D. Aylsworth, Inglewood, 1.



Among the enterprising retail companies who have expanded their stores and are backing up the work of the California Electrical Cooperative Campaign is the Valley Electrical Supply Company of Fresno, California. The picture above shows the extensive show window, and that below, a special holiday display of appliances. This company is employing seven solicitors.

NEW STORES—

Territory of C. C. Davis.—General Repair & Electric Co., San Francisco; Fisher Electric Co., San Francisco; Campanile Electric Co., Berkeley; South Berkeley Electrical Shop, Berkeley; L. H. Bullock, Oakland; Domestic Electric Appliance Co., Oakland; D. C. Stanford, Oakland; Chas. J. Sengstacker, Pleasanton; Electric Service Co., Antioch; Rex Electric Co., San Anselmo; Watts Electric Co., Burlingame; F. X. Bodin, Sunnyvale; Melrose Electric Co., Oakland; Duane-Armstrong, Martinez.

Territory of W. F. Brainerd.—J. W. Northedge, Chico; E. R. Murphy, Los Banos; A. C. Sipe, Oakdale; E. B. McKinley, Paso Robles; The Appliance Shop, Stockton; Bright Spot Electric Co., Stockton; Sullivan Electric Co., Modesto; Turner Hardware Co. (electric dept.), Modesto; Sterling Electric Co., Sacramento.

Territory of A. L. Spring.—Advance Electric Shop, Los Angeles; Broadway Electric Shop, Los Angeles; Bullock's Electric Shop, Los Angeles; Callaway Electric Shop, Los Angeles; R. H. Evans, Los Angeles; Fix-it Electric Shop, Los Angeles; Gas & Electric Appliance Co., Los Angeles; The Lamp Shop, Los Angeles; Southwest Electric Co., Los Angeles; F. E. Spencer, Los Angeles; Holland Electric Shop, Anaheim; Winder & Jones, Azusa; William Coryell, Burbank; Graham Electric Co., Calexico; R. A. Lee, Colton; The Electric Shop, Huntington Park; Acme Electric Co., Long Beach; Sanders Electric Shop, Pasadena; Werner & Tomlinson, San Jacinto; Beemer's Electric Shop, Santa Ana; Groninger Electric Service Co., Santa Ana; Prest Electric Co., San Bernardino; Electric Installation Co., Santa Barbara; Gould's Electric Co., Santa Monica; Santa Monica Electric Co., Santa Monica; T. H. Armstrong, Santa Paula; Hall & Bashore, Covina.

ELECTRICAL ADVERTISING

The cooperative advertising of the Los Angeles Gas & Electric Corporation and the Electrical Contractor Dealers started with two pages in the Los Angeles Examiner Wednesday morning, November 5th, and a page and a half in the Express, Wednesday evening, November 5th.

Below is given the schedule of the cooperative advertisements to appear in the Los Angeles papers:

Wednesdays
Examiner—Nov. 5th, 19th; Dec. 3rd, 17th, 31st.
Express—Same dates.

Mondays
Times—Nov. 10th, 24th; Dec. 8th, 22d.

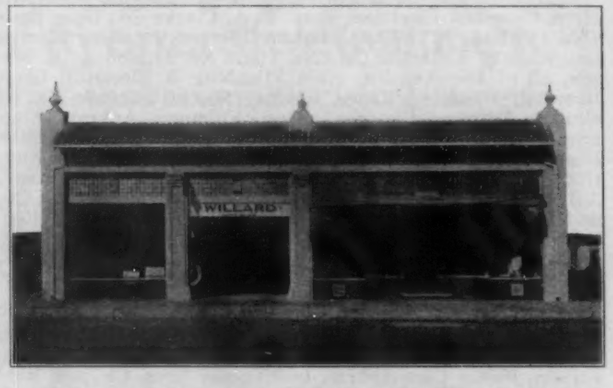
Wednesdays
Herald—Nov. 12th, 26th; Dec. 10th, 24th.

Fridays
Record—Nov. 14th, 28th; Dec. 12th, 26th.

A DOUBLE STORE

The Electric Motor Maintenance Service, conducted by the Nutt Brothers, and briefly known as the E. M. M. Service, combines under one roof an automobile service station and an exceptionally attractive electrical store. Moving from their old quarters Harry and Seymour Nutt took over the entire space of a compact one-story building in a good location in Willard, and have now been fully settled for some months.

The front of the store is distinctly pleasing, and the well-arranged display window is supplemented by a show case in the entrance.



A store which combines an automobile service station and a retail store for the sale of electrical appliances. The one company occupies the complete building, having moved in from another location, and has many enterprising plans for building up the merchandising side of the business.

A feature of the interior is the fixture room which is fitted up with a fireplace and wicker furniture, giving an attractive home effect. The smaller appliances are displayed mainly in glass cases such as jewelers use, and all crowded effects are avoided.

The Nutt Brothers plan to add several solicitors to their organization and work out special campaigns for the sale of appliances.

A feature of this attractive interior of the E. M. M. Service is the fixture room shown in the background of the picture. It has a fireplace and is furnished with wicker furniture, the whole atmosphere being extremely pleasing.

Western Ideas—

LAMP CONTRACTS, even small ones, are much sought after and particularly valued by many dealers not so much for themselves as for their possibilities. A lamp contract is an entering wedge, and if properly handled will lead to all kinds of new business in appliances. Lamps are in universal demand, and for this reason they are one of the dealer's best mediums for getting in touch with users of electricity, and spreading the idea of the electrical home. It is because so large a proportion of customers coming into an electrical store come in to buy lamps, that some dealers have adopted the plan of having the lamp counter at the back of the store, so that the customer has to walk past displays of appliances.

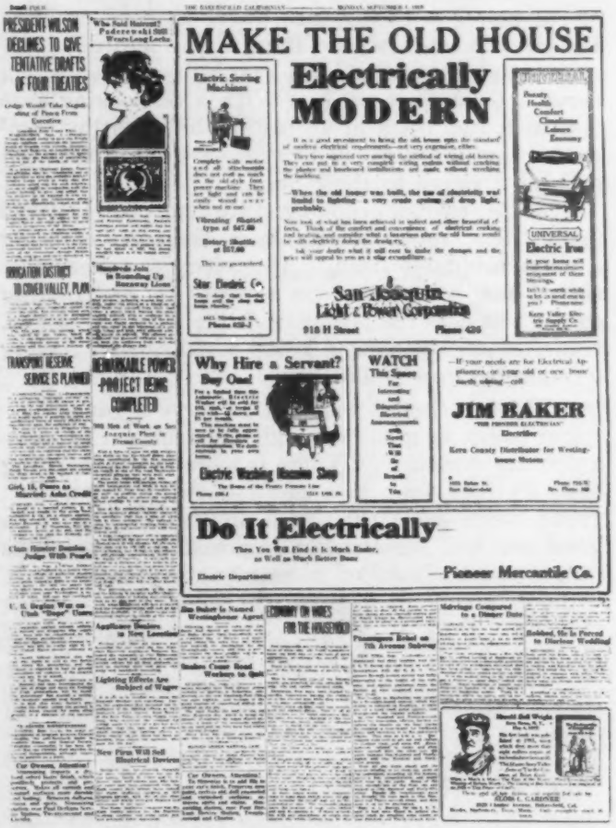
FRAMED ADVERTISEMENTS have been found by one dealer to be not only an effective and profitable form of decoration, but to be exceedingly useful for reference when making a sale. Whether it be publicity material prepared by the manufacturer, or an advertisement actually run by the dealer himself, the pictures, slogans and phraseology of such advertisements are usually the result of careful planning and much thought, and may convey to the customer the very message which will make the sale. It is frequent, also, that the customer has seen the advertisement and wishes to refer to some particular bargain mentioned in it. In such a case it is extremely convenient for the salesman to have it at hand. It also happens at times that a customer in glancing over a magazine or newspaper notices a certain appliance advertised and pays no particular attention at the time to the name of the dealer. If he should happen subsequently to enter the store to make some other purchase, and see the same advertisement framed, he will immediately connect the store with the appliance he noticed but did not need at the time. A reminder such as this will frequently lead to a sale.

HOW IT WORKS is usually of more interest to the customer buying an appliance than how it looks or how it is made. This fact should be borne in mind in the preparation of leaflets and other forms of publicity. Don't illustrate your reading matter with a picture of a dull piece of machinery or an incomprehensible-looking appliance—especially as the majority of the buyers of appliances are women. An array of screws, wires, insulators and plugs will convey very little to the average woman, and for this reason manufacturers and dealers are learning more and more to make their advertising matter show the uses of the appliance rather than its construction. The mechanism of a washing machine printed in three colors is no substitute for a cool-looking lady in a sport suit doing two days' washing in an hour and a half.

Manufacturers have recently adopted the plan of packing their smaller appliances in attractive boxes bearing pictures of the appliance in use. These boxes are not to be underestimated as selling agents.

ONE WAY OF FINDING OUT what electrical appliances a person does not own is through light troubles. Every one has light troubles, and a certain firm, when called upon to remedy them makes a point of taking stock of the rest of the electrical equipment in the establishment, ascertaining either by observation or enquiry whether or not the owner has an electric washing machine, an electric iron, toaster, percolator, and so forth. A trouble-man has a good deal of opportunity to find good prospects for electrical appliances and also to drop a timely word on the subject to the householder.

SAY A GOOD WORD for the other branches of the industry in the conduct of your business. The dealer and the power company have common interests and should work in cooperation with one another to promote the more extensive use of electricity. One branch cannot thrive without the other, and the dealer should keep in mind that his customers are also the power company's customers. This new spirit is already being shown not only in a personal way in the store, but in the various forms of cooperative publicity which are now becoming so common in the West. Central station and dealer advertise side by side, advertise jointly, and advertise each other in a way which was undreamed of a few years ago. And this mutual good-will and assistance is reacting to the benefit of every branch of the industry.



Reproduction of a page from the Bakersfield Californian, showing the large advertising spaces being used by electrical concerns, and the way in which power company and dealer are grouped as in a single advertisement, significant of the common interests of all branches of the industry. Note the electrical items in the news section also.

The Electric Range

BY PIERRE L. MILES

(Does the electric range satisfy the purchaser? Is the electric cooking load a profitable one for the central station to carry? What are the best merchandising methods to use? These and other questions connected with the electric range are taken up in the following paper, presented before a meeting of the Colorado Electric Light, Power and Railway Association.—The Editor.)

The electric range is the best cooking apparatus on the market. It will boil, fry, roast, bake, and broil, better than any other kind of range now used.

The initial cost of the range is not retarding the rapid introduction of electric cookery, as is sometimes claimed, and the cost of operating an electric range is purely a matter of educating your customers to the proper use of the range. All the cooking for a family of five may be done with 100 kw-hr. per month, and current in excess of this amount is unnecessary.

Neither is the electric range slow; if properly employed it compares favorably with other ranges wherever speed is necessary.

Though the heating of a large amount of water for bath purposes is not practical on an electric range, this will not be a deterrent to the sale of ranges, if the subject is properly handled, and the fact that the electric range will not heat the kitchen in the winter months is an advantage rather than a disadvantage.

Costs of Service—

Considering the subject from the point of view of the power company, also, there is more profit in the electric cookery load than in the lighting business: 600 watts of station generating capacity will serve a 6000 watt range. With a 3c cooking rate and with fuel costs of 1c per kw-hr., lighting companies can afford to spend at least $100 in order to connect a range to their lines.

A 3c electric cooking rate can be justified against a 5c small motor rate on the basis of being a more profitable load. The electric range load should not bear the same expense of distributing current, as does the present lighting load. A 15-kva. transformer will serve a group of 20 ranges, having a connected load of 120 kw.

The investment required to serve a range customer is not as great as originally required to serve a lighting customer. There is more profit in selling 1500 kw. per year at a profit of ½ cent per kw., (your range load) than in a profit, eight times as great per kw., for the lighting load. 200 electric ranges can be installed in nearly every small town, without having to increase the present generating capacity. Only 10 to 15% of the total connected range load will fall on the present station peak.

The diversity factor and load factor of the electric range load is far better than that of the lighting load.

Merchandising Methods—

It is not necessary for a lighting company to make any investment for the selling or advertising of electric ranges. With proper methods between 3 and 5 per cent of residential customers may be sold an electric range during the first year of electric range sales work.

Advertising alone will not sell electric ranges; a low rate for electric current will not, in itself sell electric ranges; a display and description of what the electric range is will not sell ranges.

The campaign on electric ranges should consist of two parts, educational and sales.

The cost of the inside wiring should be included in the selling price of the range. Time payments are an essential part of a successful electric range business. The manufacturers system of discounts provides to compensate the central station man for the cost of retailing.

Increasing Opportunities—

The time is coming, and it is not so very far distant, when the central station man, responsible for sales, will be called upon to show a yearly increase in kw-hrs. delivered. The electric range load offers the golden opportunity to meet this demand.

Now is the time when far-sighted men are breaking the ground for this future business. They are placing their quota for the coming year.

They have carefully considered the following two basic factors in this field of central station activity: first, is the electric range a satisfactory article to recommend to the public? Will the purchaser be compensated and fully satisfied with his investment? Second, is a rate for cooking profitable to the central station? A comprehensive study of the question will reveal that it is.

Once these two points have been settled the sales manager must not allow any of the annoying details, incidental to any new business, swerve him from the purpose of building up this phase of his business.

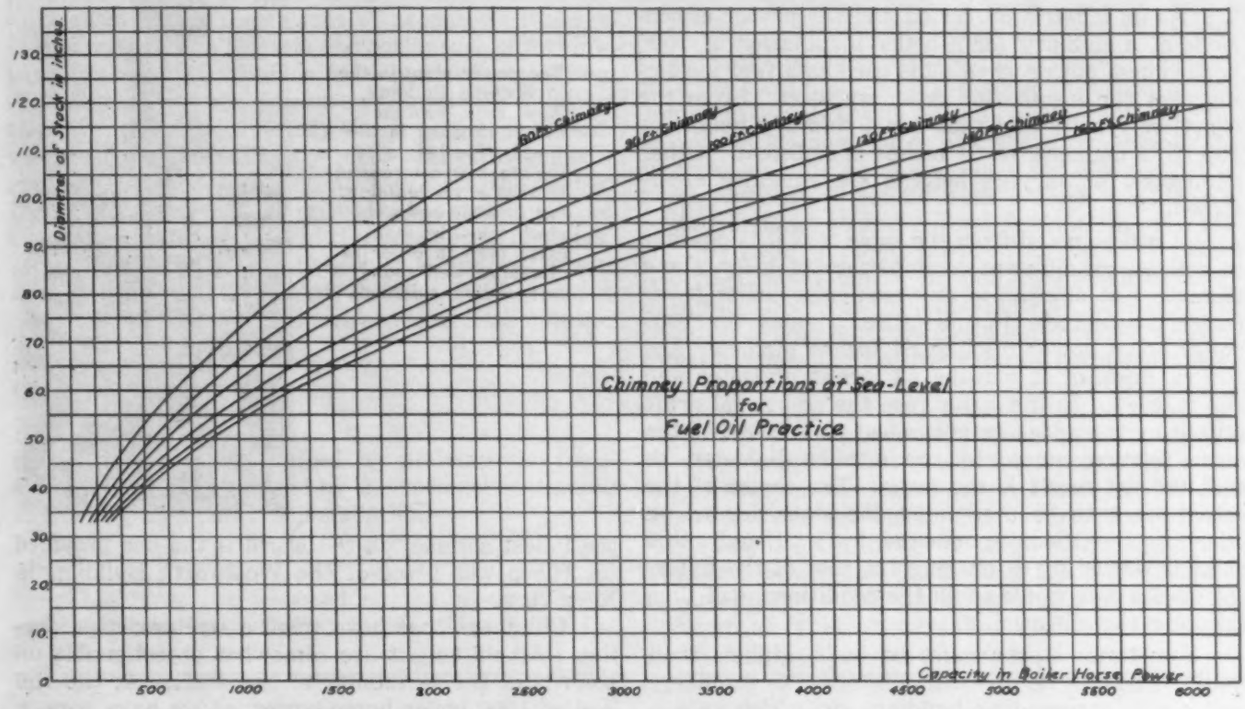
Water heating, initial cost, installation expense, time payments, heating of the kitchen, costs of selling, maintenance, are some few of the problems which are bothering central station men today. They are merely the details of the two basic facts. With earnest application they can and will be solved. But not by sitting back and hopelessly repeating "Electric ranges cannot be sold," because of this or that reason.

The building of the range load is hard—sometimes very hard. But it can be done. It takes both brains and live sales energy. It takes the pioneer, stick-to-it quality which made a success of the telephone, the automobile, the electric light, and every other new device brought on to the market.

First, be sure you are right in the first two points. Then go ahead, confident of success in the knowledge that if your fundamentals are correct, all other questions and conditions are capable of being solved and overcome.

FUEL OIL AND STEAM ENGINEERING

(A convenient chart is here given for determining the diameter of the chimney at sea-level, and also for corrections necessary to meet the changes in altitude. A comprehensive discussion of the applications of these principles to concrete practice, especially as adapted to the use of fuel oil is here presented by the authors of the book on "Fuel Oil and Steam Engineering" recently published.—The Editor.)



A DIAGRAM FOR ASCERTAINING CHIMNEY DIAMETERS IN FUEL OIL PRACTICE

In this diagram which has been drawn up from carefully collected data of C. R. Weymouth, the stack diameter for boiler installations of known capacity may be at once ascertained. The sizes of chimney as determinedfrom this diagram are for nominal rated horsepower, as set forth with an allowance made for an overload capacity of fifty per cent. The proportionsare computed for sea-level conditions.

SAVING THE WASTE IN THE CHIMNEY—VI. CHIMNEY PROPORTIONS FOR FUEL OIL PRACTICE

BY ROBERT SIBLEY AND CHAS. H. DELANY

After the great earthquake and subsequent conflagration in San Francisco in April, 1906, an unusual opportunity was offered for securing chimney data for fuel oil consumption, due to the fact that many stacks were partially demolished and it was therefore easy to secure data for varying heights of stacks.

An excellent paper by C. R. Weymouth setting forth the fruits of a careful investigation undertaken by him at this time may be found in the Transactions of the American Society of Mechanical Engineers, Vol. 34. The Babcock & Wilcox Company have adopted from the investigations of Mr. Weymouth a comprehensive table as shown below for picking the height and diameter of chimneys for crude oil consumption.

STACK SIZES FOR OIL FUEL

Diameter inches	Height in Feet above Boiler Room Floor					
33	161	206	233	270	306	315
36	208	253	295	331	363	387
39	251	303	343	399	488	467
42	295	359	403	474	521	557
48	399	486	551	645	713	760
54	519	634	720	847	933	1000
60	657	800	913	1073	1193	1280
66	813	993	1133	1333	1480	1593
72	980	1206	1373	1620	1807	1940
84	1373	1587	1933	2293	2560	2767
96	1833	2260	2587	3087	3453	3740
108	2367	2920	3347	4000	4483	4867
120	3060	3660	4207	5040	5660	6160

An Example of Chimney Design for Sea-Level Installation —

Let us from this data ascertain the diameter of a one hundred foot chimney capable of properly creating a draft for a one thousand horse power boiler installation so that the stack is of sufficient size to accommodate a 50 per cent overload. It is assumed that the stack is centrally located and that it has short flue connections with ordinary operating boiler efficiency. Since the data has been compiled to meet these conditions we find from the tables that a chimney 100 ft. high and 60 inches in diameter will develop sufficient draft for 913 boiler horse power

capacity and that a sixty-six inch diameter will develop 1133 boiler horse power. By interpolation we find that a 64 inch diameter will meet the conditions desired.

This data when plotted on a chart as shown in the illustration gives a convenient method of quickly and accurately ascertaining the diameter of a chimney for heights varying between eighty feet and one hundred sixty feet for installations at sea level.

As an illustration, let us find the proper dimensions of a chimney for a boiler installation of 1000 boiler horse power when oil is used as a fuel, assuming that the installation is at sea level. From the chart we readily find that for a chimney height of 100 ft., a diameter of 64 inches is sufficient. Other diameters for varying heights are similarly ascertained.

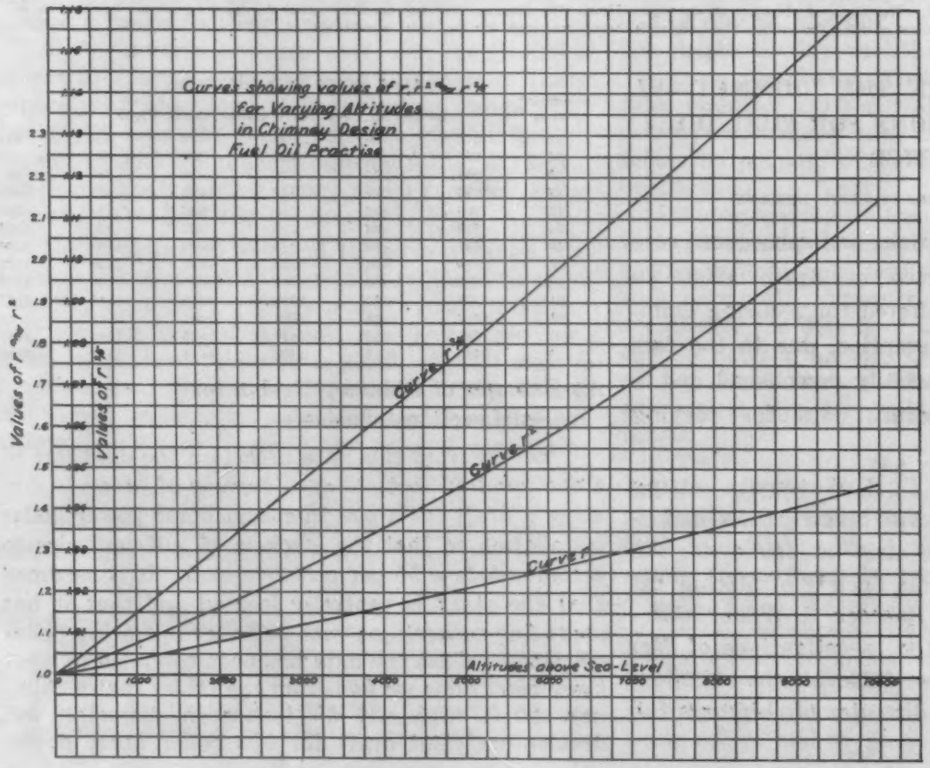
It will be noted from the table that it is possible to get several different combinations of heights and diameters of stacks for any particular boiler horse power considered. For instance, a stack for 1000 boiler horse power may be 64 inches diameter and 100 ft. high, or it may be 54 inches diameter and 160 ft. high. In the latter case the additional draft caused by the added height is lost on account of the extra friction caused by the smaller diameter, so that the net result is the same. The choice of the actual stack to be used must therefore depend on other considerations besides the draft. Usually this point is settled by estimating the cost of the different stacks that would fulfill the conditions, and then selecting the cheapest.

Sometimes stacks must be built higher than would otherwise be necessary, in order to discharge well above surrounding buildings, in which case a smaller diameter may be used than would be required for a lower stack. In tall office buildings the height of the stack is determined by the height of the building itself. It is not generally known that

The power plant in the Woolworth Building, New York, has the tallest chimney in the world. The height of the stack is determined by that of the building, but in some cases the stack must be built extra high in order to discharge well above surrounding buildings.

the tallest chimney in the world is the one provided for the power plant of the Woolworth Building in New York.

Chimneys that have small diameters in proportion to their height are somewhat objectionable on account of the variability of the draft. At the full load of 1000 boiler horse power, as we have seen, a



FACTORS FOR DETERMINING CHIMNEY PROPORTIONS AT ANY ALTITUDE

When chimney proportions are desired for altitudes other than sea-level, the ratio of barometric pressures at sea-level and the new altitude enters with the first power, the square and the two-fifths power. This diagram enables the designer to pick these factors for any altitude with ease.

54" x 160 ft. stack gives the same draft as a 64" x 100 ft. stack. At light loads, however, the 54" x 160 ft. stack will give a much greater draft, for it still has its full height, but the friction loss is much less. This increase of draft at light loads requires special care on the part of the boiler fireman to adjust his dampers for proper air regulation.

Corrections in Chimney Height for Altitude

We shall next consider the necessary corrections to be made in the dimensions of proposed chimneys in their relation to altitude above the sea. All chimney dimensions and tables have been computed on the basis of sea-level pressures. From our equation of draft readings previously derived, it is seen that the draft depends directly upon the atmospheric pressure. Hence it is evident that since the higher the altitude, the less the pressure, the stack must be lengthened in proportion to the barometric readings. Thus if H is the proper height of a chimney at sea level or barometric pressure P_o, then H_1 the proper height at the altitude P_1 above sea level is as follows:

$$\frac{H_1}{H} = \frac{P_o}{P_1} \qquad (95)$$

or if r is a factor obtained by dividing the barometric reading at sea level by the barometric reading at the proposed point of installation,

$$H_1 = rH \qquad (96_a)$$

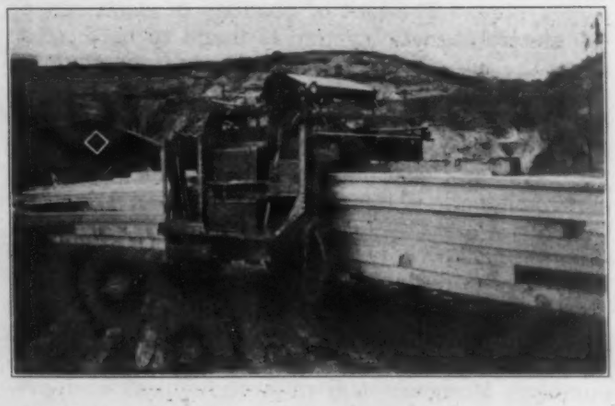
This reasoning is based on the assumption of constant draft measured in inches of water at the base of the stack for a given rate of operation of the boilers regardless of altitude.

Weymouth, however, advances a new theory in his paper above referred to, when the assumption is made that boilers, flues, and furnace remain the same, and further that the increased velocity of a given weight of air passing through the furnace at a higher altitude would have no effect on the combustion. Under such an assumption it is evident if a given boiler plant, with its stack operated with a fixed fuel, be transplanted from sea level to an altitude, assuming temperatures to remain constant, that the total draft head measured in height of column of external air will be numerically constant. The velocity of chimney gases will, therefore, remain the same at altitude as at sea level and the weight of gases flowing per second with a fixed velocity will be proportional to the normal barometric pressure. On this assumption it follows that the increased frictional losses can be compensated at altitudes by a suitable increase in the diameter and that the chimney height must be increased inversely proportional to the square of the ratio of barometric readings r or

$$H = r^2H \qquad (96_b)$$

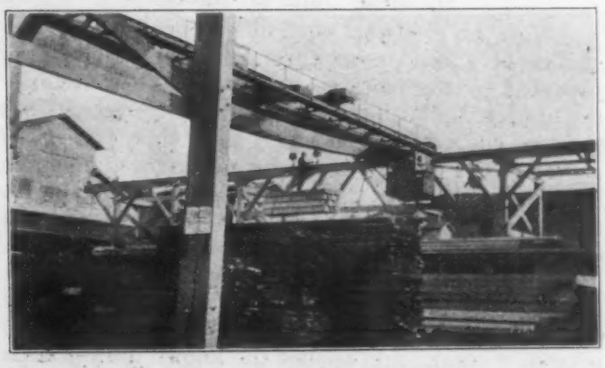
It is possible that the true correction lies somewhere between the values ascertained by the two theories above set forth. A computation on the latter basis of the inverse of the square is probably, however, nearer the truth than the former and it is certain that any error involved is well within the accuracy of other constants involved in the design.

Special Applications of Electricity in the Lumber Industry



Above is shown an electric truck employed by the Peninsula Shipbuilding Company, St. Johns, Oregon. This truck is built especially for heavy duty, handling lumber and timbers for the big wooden vessels. It makes good speed and is very efficient.

At the right below is shown a thirty-ton electric crane speeding up lumber production at Springfield, Ore. It is the property of the Booth Kalley Lumber Company, and handles large quantities of lumber in a highly satisfactory manner.



The New Physics

BY A. C. CREHORE

(The elimination of one of the unknowns from a basic equation lays the foundation for a clearer understanding of fundamental electrical theory. The author of this interesting series of articles has advanced important new theories in physics which are the subject of widespread discussion.—The Editor.)

So long as attention was confined to quantity of electrical charge and to quantity of magnetism alone, it never appeared that there was any need for a unit of quantity of electricity on the electromagnetic system of units, nor of quantity of magnetism on the electrostatic system of units, for these quantities differed so in kind apparently that there was no possible way of measuring one by the unit adopted for the other. It soon appeared, however, that the electric current is a kind of connecting link between these apparently different kinds of quantities, and that electric current could be measured in the units of either system.

This becomes evident when we reflect that two charged conducting spheres may be completely discharged by connecting them with a conducting wire provided their charges are equal and of the opposite sign. In other words the discharge of a condenser, for the two spheres constitute an electrical condenser, causes an electrical current to flow in the discharging wire, and some unit had to be found by which to measure this current. Also some law had to be discovered connecting the value of the current produced by the condenser with the value of the original charge of it. This law states that the electrical current is equal to the time rate of change of the original charge. It takes time to discharge a condenser, but usually the time is very brief according to our common notions of time, so short indeed that the measurement of the time at first presented some difficulties.

And again, Faraday showed that it was possible to produce a current of electricity without the use of a condenser at all, by the very simple process of moving a magnet in the immediate vicinity of an electrical conductor, and he worked out with consummate skill the exact laws that now bear his name, by which quantity of magnetism and the electric current produced by any definite relative motion between the conductor and the magnetic field become connected by definite expressions.

Different Units of Current

Now, an electrical current produced by the discharge of a condenser through a wire and again produced by the motion of a magnet in its vicinity, are apparently just the same kind of thing. Indeed the two currents are so much alike that, if the observer of the current itself did not know the source from whence it was derived, he would be unable to tell what the source of it is. It has precisely the same effect upon any of the instruments at his disposal for the purpose of detecting and measuring electrical currents. But, let us now suppose that the observer of the current knows of the source from whence it comes, and applies the known laws in each case to obtain the measure of precisely the same magnitude of current, the first obtained from the condenser, and the second obtained from the motion of the magnet. He is surprised to find that the numbers obtained when using the electrostatic system of units and the condenser are very large indeed as compared with the numbers obtained when using the magnet, and the electromagnetic system of units. Indeed, a study has been carried out in this way to find the constant ratio between the numbers obtained for the same current on the electrostatic system and on the electromagnetic system of units. This ratio comes out the same every time and is equal to the number approximately 30,000,000,000, which is for brevity always written 3×10^{10}. The larger number is obtained when the electrostatic units are employed, and the smaller when the electromagnetic units are used. The meaning of this is that the electromagnetic unit of electric current is this large number of times greater than the electrostatic unit of current, and that this has resulted simply because of the arbitrary methods of choosing the units of quantity of electricity and of magnetism, not knowing at the time that they implied such different units of current.

Having thus established a unit of current on each system of units, each of the other units in turn receives expression in both systems, including the units of quantity of electricity and of magnetism with which we started. And in a similar manner the ratios of the magnitudes of each of the units for the same kind of quantity have been measured in each system. The unit of quantity of electricity on the electromagnetic system is found to be 3×10^{10} times the unit of quantity of electricity on the electrostatic system. The unit of electromotive force on the electrostatic system is 3×10^{10} times larger than the unit for electromotive force on the electromagnetic system. The unit of electrical capacity on the electromagnetic system is found to be 9×10^{20} times the unit of capacity on the electrostatic system.

Electromagnetic Theory of Light

The result thus obtained is very surprising because the ratios between the units always come out the same number, 3×10^{10} or some power of this number. Moreover, this number happens to represent very exactly the numerical value of the velocity with which light travels. This is very strange, and it resulted merely from the manner in which these units were originally defined. It is inevitable to avoid the conclusion that the phenomena of light are in some way very intimately connected with those of electricity and of magnetism. It was James Clerk Maxwell who first pointed out that there is a very definite connection between light, electricity and magnetism in his celebrated treatise on Electricity and Magnetism, in which he developed an electro-

magnetic theory of light. He predicted in this that, when electromagnetic waves were discovered at some future time, it would be found that they will travel at the same velocity as light waves do. This prediction has been fulfilled since that time, and the waves now in common use in so-called wireless telegraphy travel at the speed predicted by Maxwell.

One of the reasons for mentioning this subject here is that during the course of developing his electromagnetic theory of light, it was shown to be a necessary condition that the product of the specific inductive capacity and of the magnetic permeability of the medium shall be numerically equal to the reciprocal of the square of the velocity of light. The relation may be thus expressed,

$$k\mu = 1/c^2,$$

where c denotes the velocity of light. In other words, the so-called dimensions of the product of k and μ have been known ever since Maxwell's day, namely $L^{-2}T^2$, the reciprocal of the square of a velocity. But this did not give any knowledge of either one of the two quantities independently. It rendered it likely, however, that k and μ depend upon space and time alone rather than upon space, mass and time. This is in agreement with the statement made above that specific inductive capacity may be considered to be the reciprocal of a velocity, for this involves space and time only, and not mass. But, if this is the correct interpretation of specific inductive capacity, the relation found by Maxwell automatically determines the magnetic permeability and makes it also the reciprocal of a velocity, the same kind of a quantity as specific inductive capacity. It is a direct consequence of this that electrical charge and quantity of magnetism have the same dimensions and represent the same sort of kind of quantities.

TABLE I.

Quantity		Dimensions on Electrostatic System of Units				Dimensions on Electromagnetic System of Units				Dimensions Length Mass and Time			Space Time System	
		Exponents only expressed												
		L	M	T	k	L	M	T	μ	L	M	T	L	T
Mass,	m	0	1	0	0	0	1	0	0	0	1	0	1	-1
Momentum,	mv	1	1	-1	0	1	1	-1	0	1	1	-1	2	-2
Moment of momentum,	mva	2	1	-1	0	2	1	-1	0	2	1	-1	3	-2
Energy,	mv^2	2	1	-2	0	2	1	-2	0	2	1	-2	3	-3
Force,	F	1	1	-2	0	1	1	-2	0	1	1	-2	2	-3
Spec. Induc. Capacity,	k	0	0	0	1	-2	0	2	-1	-1	0	1	-1	1
Magnetic Permeability,	μ	-2	0	2	-1	0	0	0	1	-1	0	1	-1	1
Electric Capacity,	C	1	0	0	1	-1	0	2	-1	0	0	1	0	1
Coef. of Self Induction,	L	-1	0	2	-1	1	0	0	1	0	0	1	0	1
Electrical Resistance,	R	-1	0	1	-1	1	0	-1	1	0	0	0	0	0
Electromotive Force,	E	½	½	-1	-½	3/2	½	-2	½	1	½	-3/2	3/2	-2
Magnetomotive Force,		3/2	½	-2	½	½	½	-1	-½	1	½	-3/2	3/2	-2
Electric Force,		-½	½	-1	-½	½	½	-2	½	0	½	-3/2	½	-2
Magnetic Force,	H	½	½	-2	½	-½	½	-1	-½	0	½	-3/2	½	-2
Electric Displacement,	D	-½	½	-1	½	-3/2	½	0	-½	-1	½	-½	-½	-1
Magnetic Flux Density or Induction,	B	-3/2	½	0	-½	-½	½	-1	½	-1	½	-½	-½	-1
Quantity of Electricity,		3/2	½	-1	½	½	½	0	-½	1	½	-½	3/2	-1
Quantity of Magnetism,		½	½	0	-½	3/2	½	-1	½	1	½	-½	3/2	-1
Total Magnetic Flux,		½	½	0	-½	3/2	½	-1	½	1	½	-½	3/2	-1
Planck's Constant,	h	2	1	-1	0	2	1	-1	0	2	1	-1	3	-2
Rydberg's Constant,	K	0	0	-1	0	0	0	-1	0	0	0	-1	0	-1
Newtonian Constant,		3	-1	-2	0	3	-1	-2	0	3	-1	-2	2	-4

In order to give a more comprehensive idea of what it means to have found the separate dimensions of specific inductive capacity and magnetic permeability Table I has been prepared. In the first column appear the common names of the kinds of quantities whose dimensions are given in the other columns. In the second column are given in some instances the symbols commonly used for the quantity, but there is no standardization of these symbols as yet, and these letters have no great significance. In the next group of four columns appear the common dimensions of the quantities on the electrostatic system. For example, quantity of electricity has opposite to it the numbers 3/2 1/2 –1 1/2, as representing the exponents of the letters at the tops of these columns, which makes the dimensions of quantity of electricity, $L^{3/2}\ M^{1/2}\ T^{-1}\ k^{1/2}$, the same as the dimensions derived in the text above for the electrostatic system.

The next group of four columns gives the values of the exponents of L, M, T and μ, thus representing the dimensions of the same units or quantities on the so-called electromagnetic system of units. Since by Maxwell's equation, $k\mu = 1/c^2$, or $k = 1/\mu c^2$, we may convert any electrostatic dimensions into electromagnetic by merely substituting for the k in the electrostatic column its equivalent in terms of μ. And, because the k does not involve mass it is seen that the exponents of mass are exactly the same for each quantity in the two systems.

If for the k in the electrostatic column its equivalent dimensions, $L^{-1}T$, are substituted, the k is entirely eliminated, and the exponents given in the next group of three columns are obtained. Or, if for μ in the electromagnetic column its equivalent, $L^{-1}T$, is substituted, we obtain precisely the same exponents for L, M and T as by eliminating the k from the electrosatic column. This gives as a result a single system of units for all quantities in terms of length, mass and time only.

. Nature of Electrical Resistance

It appears from this new table that quantity of electricity and quantity of magnetism are quantities of the same nature having the same dimensions as already pointed out. Also, specific inductive capacity and magnetic permeability have the same nature, as already stated. And again, electrical capacity and the coefficients of self and of mutual induction have the same dimensions. Electrical resistance becomes dimensionless in terms of length and time. It was already dimensionless in terms of mass in each of the former systems, and in the electromagnetic system it had the dimensions of a velocity times μ, which is now the reciprocal of a velocity. Hence electrical resistance is of the nature of the ratio of two different velocities, and has no dimensions at all, being simply a numeric like the quantity, β, which usually denotes the ratio between the velocity of an electron and the velocity of light.

Because of the relation expressed by Ohm's law, namely R = E/I since resistance is dimensionless it follows that electromotive force has the same dimensions as electrical current and it so appears in the new table. Also magnetomotive force has the same dimensions as electromotive force, indicating that they are each quantities of the same nature. And again, electrical quantity divided by a time gives electrical current. We have seen that the rate of change of the quantity of electrical charge is equal to current. And again, electric force has the same dimensions as magnetic force, and electric displacement the same as magnetic flux density, that is magnetic induction.

In other words the results obtained by making k the reciprocal of a velocity are not irrational. The quantities that might be expected to be the same

come out the same, and there is nothing about it that looks like chance. They do not come out in any haphazard fashion, as they certainly would if the dimensions assigned to k were different from the reciprocal of a velocity.

Elimination of Mass

The last two columns of the table must be mentioned in advance of the narrative. In this new table appear only length and time, mass having been eliminated from the preceding columns. Reasons have appeared that make mass the reciprocal of specific inductive capacity, and taking specific inductive capacity as the reciprocal of a velocity, this gives mass the dimensions of a velocity, $L T^{-1}$. Hence, granting this, mass is not a fundamental unit like length and time, because it may be expressed in terms of them, and consequently it has been eliminated by putting for each M in the previous tables the dimensions $L T^{-1}$. This operation does not affect any of the statements just made concerning the similarity of the magnetic and the electrical units, for mass already appeared in each of these with the same exponent for each kind of unit in the two systems.

We have, therefore, arrived at a final table of dimensions of units in terms of length and time only, having eliminated three of the quantities that formerly were required, namely, specific inductive capacity, magnetic permeability, and mass. It is not to be expected that we can go further than this, and it is very natural to retain space and time as the preferable kinds of quantities in which to express the dimensions o fall units whether mechanical, electrical or magnetic.

Technical Hints

BY LOUIS ETSHOKIN

(The various elements which cause power losses in electrical machinery are here discussed by the electrical engineer of the Halcun Radio Company. This is the third of a series of articles discussing the theories back of familiar problems and practices in practical electricity.—The Editor.)

FACTORS CAUSING POWER LOSSES IN ELECTRICAL MACHINERY

No mechanical or electrical piece of apparatus can be 100% efficient, although some in the electrical field are nearly that. Electrical machinery may be divided into two general classes, rotating and stationary. Of course rotating machinery has the losses due to bearing friction, brush friction and windage. With very high speed machines, the latter mounts up to considerable proportions.

The other losses are common to both stationary electrical apparatus like transformers, and rotating electrical apparatus such as motors and generators. These losses can be subdivided into the two classes of copper and iron losses.

Copper Losses —

The copper loss depends on the square of the current times the resistance, or is I^2R. This means that the loss increases very rapidly as we increase the current. For example, if we double the resistance we increase this loss two times; if we double the current, we increase it four times.

On the face of it, it would seem then, that if we had two ten-kw. generators of equal size, one delivering 90 amps. at 110 volts, and the other 45 amps. at 220 volts, that the former would have four times the I^2R loss of the latter. Let us see if this be so.

Assume that the conductor in the machine carries 22½ amps. Then the 110-volt machine divides

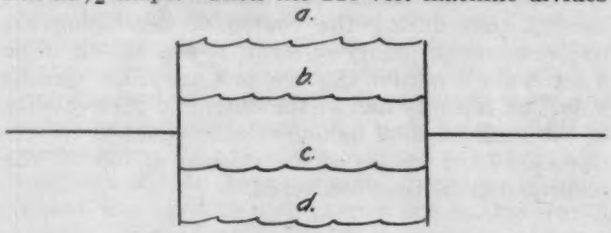


Fig. 1

Assuming that the conductor in the machine carries 22½ amps., the 110-volt machine divides its conductors into four circuits in parallel, each circuit producing 110 volts.

its conductors into four circuits in parallel (Fig. 1), each circuit producing 110 volts. The 220-volt machine divides its conductors into two circuits (Fig. 2). Call the resistance of each circuit independently, one ohm. Then the resistance of Fig. 1 is ¼ ohm. The resistance of Fig. 2 is 1 ohm. The I^2R loss for Fig. 1 is $90^{-2} \times ¼$. The I^2R loss for Fig. 2 is $45^{-2} \times 1$. They are both the same. We can state this axiom: Two machines with the same amount of copper and the same number of amp. per sq. in. of copper, or **current density,** will have the same I^2R loss.

To cut down copper losses we must increase the amount of copper. Good design strikes a balance between excessive losses and excessive original first cost, and the current density runs between 1500 and 3000 amps. per sq. in. in practice.

Iron Losses —

Iron losses may be divided into two classes, eddy current loss, and hysteresis loss. The former is

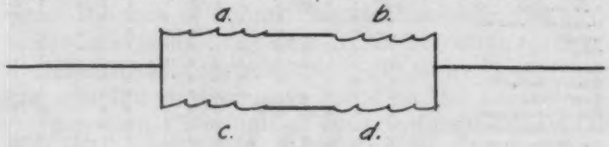


Fig. 2.

The 220-volt machine divides its conductors into two circuits. The I^2R loss is $45^{-2} \times 1$.

due to the short circuited current produced in the iron just as current is produced in the copper conductors. It may be cut down to very little by laminating the iron which is cut by lines of force of a magnetic field. This increases the resistance, thus cutting the current down tremendously, with the result that the power loss, I^2R, is cut down.

Hysteresis loss is due to the actual turning of the molecules of the iron as it is magnetized first in one direction and then in the opposite direction. It is really molecular friction and is cut down by choosing the right kind of iron or steel. The most favorable steel is soft steel with a rather high amount of silicon.

SPARKS—Current Facts, Figures and Fancy

(Recent new ideas include a wireless fog signalling device, electrical incubators, and an especially durable kind of paint. The "better lighting" campaign has been extended to policemen in Boston. Lemon drops seem to be the American soldier's staff of life, but in view of the disconcerting relationship between chewing gum and asphalt perhaps this is just as well.—The Editor.)

France is sending whippet tanks to the farmer to supply motive power to plow, cultivate, harvest and transport.

* * *

It is reported that certain large munitions works in Germany are perfecting an aeroplane which is practically noiseless in flight.

* * *

Speaking of statistics, this is one of the best for some time: the boys in France have been eating 200,000 pounds of lemon drops per month.

* * *

The Norwegian Fishery Administration is considering using electrically propelled boats in its fishing fleet. A considerable sum has been allotted for conducting research along these lines.

* * *

Application of electricity as a means of heating incubators and brooders is being proved so successful in economy and simplicity of operation that it will undoubtedly supplant all other methods of artificial incubation within a very short time.

* * *

It has been suggested that the humming of telegraph wires is due to changes of temperature which tighten or loosen the wire. No satisfactory explanation of the phenomenon has yet been advanced. The common belief that it is caused by the wind is erroneous, as the humming is heard during perfect calms.

* * *

The first business house in the world to employ an aeroplane of its own as part of its regular organization is said to be an English steamship and export company at Cardiff, Wales, which maintains a flying service for the transportation of important papers, samples, offers, and so forth, and to keep in personal touch with foreign buyers.

* * *

According to figures compiled by the United States Geological Survey from reports sent in by manufacturers of turbines and impulse wheels in the United States, the total horsepower of water wheels shipped during 1918 for the three states of Georgia, South Carolina and Tennessee, is almost equal to that shipped to all the other states.

* * *

Experiments are being carried on to establish a radio fog signaling system which will make the navigator independent of the lighthouse lamp. In connection with these experiments radio transmitting apparatus is being placed at three lighthouses in Chesapeake Bay, and the radio receiving apparatus and direction finder installed on a lighthouse tender.

* * *

There are more than 300 by-products made from petroleum. These include paraffin wax, chewing gum, asphalt, tar, soap, turpentine, vaseline, coke, pitch, etc. A short time ago we were rather disturbed at coming across an announcement of a "soap and margarine factory;" but it appears we may yet expect to see a company advertising as "manufacturers of chewing gum and asphalt."

* * *

A paint manufacturer in England is showing samples of black paint or enamel which, on a five-year test in the tropics and a seven-year test in England, appears to be still unaffected by the action of atmosphere or water. This enamel is reported to withstand 700° F., 50 per cent sulphuric, and to be a non conductor and thus to resist electrolysis. It is said to have a covering capacity up to 13,000 square feet per hundredweight.

* * *

The actual cost of conducting the war, not including property destroyed, was between two hundred and two hundred and fifty billion dollars, according to estimates of the State Department. This was divided as follows: Great Britain, $50,000,000,000; United States, $25,000,000,000; France, $25,000,000,000; Germany, $35,000,000,000; Italy $12,500,000,000. The remainder of the total was made up by the smaller countries engaged.

* * *

A new product suitable for use in electrical insulation is being obtained from the treatment of kelp in Australia. The moist precipitate is subjected to pressure and formed under pressure, after which it is hardened by treatment with formalin. The finished article is made by turning on the lathe, and a high polish is applied. The raw product is to be found in large quantities around the coast of Australia, and in particular on the Tasmanian shores.

* * *

Electrically illuminated policemen have been inaugurated in Boston. The traffic officer wears a head dress consisting of a light framework of copper wires, fitted over the hat, and bearing a small incandescent red bulb at the apex. This is lighted by electric current from a battery carried in the pocket. A white shoulder harness makes it possible to see the officer several blocks away. The Oregon police, on the other hand, are to wear civilian clothing at night. Is this a subtle compliment to Western criminals?

PERSONALS

M. E. Hixson has been appointed advertising field representative of the California Electrical Cooperative Campaign, and will devote his energies to the building up of special electrical advertising pages and sections in California newspapers, especially in the northern part of the State. Mr. Hixson, as advertising manager of the Bakersfield Californian, was the pioneer in the development of the electrical page idea on the Pacific Coast. He brings to his new duties, which he assumes on December 1st, much valuable experience in the advertising and publicity field.

S. B. Gregory, of the Arrow Electric Company of San Francisco, is visiting in Portland.

R. F. Oaks of the National Carbon Company is among recent visitors to Portland and Seattle.

A. G. Griswold, of the A. G. Electric Company of Seattle, spent several days in Portland recently.

O. B. Stubbs of the Stubbs Electric Co., Portland, Oregon, is making an extensive tour of the East.

G. E. Armstrong, protection engineer for the Southern California Edison Company, is a recent San Francisco visitor.

T. E. Burger, Los Angeles manager for the Baker Joslyn Company, has recently returned from a trip East.

Fred F. Henshaw, of the U. S. Geological Survey, has just returned to Portland after an extended trip in the East.

H. C. Jones, secretary of the Oregon Association of Electrical Contractors and Dealers, is on a business trip to Vancouver, B. C.

Roy Turnball, of the Seattle office of the Edison Electric Lamp Company, was on a business trip to Portland and vicinity recently.

M. L. Joslyn, president of the Baker Joslyn Company, has returned to Chicago after visiting his Los Angeles, San Francisco and Seattle branches.

H. H. Thedinga, of Seattle, representing the Garland-Affolter Engineering Company, has been visiting Portland where he made several business calls.

W. C. Wurfel, district manager, Westinghouse Lamp Company, has returned to San Francisco after an extended business trip through Arizona and New Mexico.

Jesse M. Smith, past president of the American Society of Mechanical Engineers, and at present a consulting engineer of New York City, is a recent San Francisco visitor.

James H. Polhemus, general manager of the Coos Bay Shipbuilding Company of Marshfield, Ore., has been appointed port engineer and general manager of the port of Portland.

C. B. Merrick, for some time field manager for the Journal of Electricity, has accepted a position with the inspection department of the San Joaquin Light & Power Corporation.

Dick Chamberlain, formerly representative of the Hurley Machine Company, has been made Pacific Northwest manager of the company with offices in the L. C. Smith building, Seattle.

L. A. Knott, Pacific Coast representative of the Sangamo Electric Manufacturing Company, is a recent visitor to the home offices in the East, but is now again in his San Francisco headquarters.

C. B. Clingensmith, formerly of the Capital Electric Co. of Salt Lake City and the Montana Company of Butte, has accepted a position as general salesman with the Fobes Electric Company, Portland, Oregon.

Howard Angus, secretary of the California Electrical Cooperative Campaign, has been appointed vice-chairman of the membership committee of the Pacific Coast section of the National Electric Light Association.

Herbert J. Flagg has been appointed chief engineer of the state public service commission of Washington to succeed **D. F. McCurrach,** who has resigned to join the engineering staff of the North Coast Power Company at Portland.

Milton Rupert, general manager of the R. D. Nuttall Company, Pittsburgh, and Lester H. Keim, manager of the Tractor Gear Department of the same company, were visitors in San Francisco during the latter weeks of November.

Dr. Ira B. Cross of the University of California will address engineers of San Francisco on Tuesday, Dec. 2nd, under the auspices of the American Association of Engineers. His subject will be "What Kind of Engineers the World Needs."

J. C. Hobrecht of Sacramento is scheduled to address the San Francisco Electrical Development League at the luncheon meeting of December 1st at the Palace Hotel. His talk will deal with the problems of the retailer of electrical goods.

Newcomb Carlton, president of the Western Union Telegraph Company, accompanied by J. C. Williner, W. N. Fashbaugh and C. W. Yorke, vice-presidents of the same company, all from New York, are recent San Francisco visitors.

W. E. Symonds, of the Wilson Welder and Metals Company, New York, consulting engineer and member of the finance committee of the A. S. M. E., is among recent visitors to the West and has been spending some time in San Francisco.

L. E. Voyer, illuminating engineer of the Edison Lamp Works, has been in charge of the special exhibit of Edison and National Mazda lamps in the "Made-in-Oakland Week" at the T & D Theater, Oakland, during the last week of November.

Capt. W. B. Mel, recently discharged from the S. O. S., after service in France, and formerly with the Pacific Gas & Electric Company in San Francisco, has accepted a position as assistant superintendent with the Pauwella Pineapple Company at Maui, T. H.

Julean Arnold, United States Commercial Attache at Peking, China, lately arrived in San Francisco on leave. Mr. Arnold is well known to men of the industry, having addressed the San Francisco Electrical Development League and other electrical organizations during his last sojourn in California. Much favorable interest has been aroused by able articles on electric power developments in China which Mr. Arnold has contributed to the Journal of Electricity. On his present trip Mr. Arnold will visit Washington, D. C., and make a tour of the United States before returning to the Orient.

R. J. Davis, district sales manager of the Century Electric Company with headquarters in San Francisco, has moved into the offices formerly occupied by the Journal of Electricity in the Electric Bldg., 171-173 Second street. Mr. Davis will be long and favorably remembered as the staunch pioneer who financed and fathered the Journal of Electricity for so many years, beginning in this activity way back in 1895. In September last he retired from a substantial part ownership and from the directorate of the Journal of Electricity when the publication was taken over by the McGraw-Hill Co., Inc., at which time he occupied the position of treasurer. Every good wish is heard on all sides for the success and attainment in affairs of the electrical industry he so richly deserves.

Albert Meinema, manager of the automobile equipment department of the Electric Appliance Company, San Francisco, has returned from an extended tour of the East. While on his trip, Mr. Meinema attended several conventions of importance to the automobile industry.

Chas. F. Farmer, of Missoula, Montana, has been appointed engineer for District No. 4 in Western Montana that is contemplating the raising of water electrically or otherwise from the Missoula river in order to irrigate several thousand acres of land in the lower Missoula and Frenchtown Valleys.

Frank B. Jewett, chief engineer of the Western Electric Company, was a recent Salt Lake City visitor. During his stay he gave a very interesting account of "Some War-Time Developments in Electrical Communication and Allied Fields" before the Utah branch of the American Institute of Electrical Engineers.

W. D. Ward, sales representative with the Pelton Water Wheel Company in San Francisco, has been made manager of the company's Atlantic division with headquarters in New York City. On the eve of his departure to assume his new duties Mr. Ward was tendered a dinner at the San Francisco Engineers' Club by a number of local engineers.

C. C. Moore, president of C. C. Moore and Company, engineers of San Francisco, has recently been chosen president of the San Francisco Council of the Boy Scouts of America. Mr. Moore has been greatly interested in the work of the organization in the past and has consented to accept the position in the interest of the boys of the community.

Aubrey Drury, associate editor of the Journal of Electricity, has been appointed secretary of the Foreign Trade Club of San Francisco. **William E. Hague,** whom he succeeds in this office, is one of the partners in Hague & Co., Exporters, established in the Monadnock Building, San Francisco. Early in the year Mr. Hague leaves for an extended business trip to Siberia.

F. D. Fagan, district sales manager, Edison Lamp Works, San Francisco, was chairman of a meeting of electrical men held at the Jonathan Club, Los Angeles, on Monday, November 24th, to discuss the proper voltage lamp for use in Southern California. It was decided that the proper lamp was 110 volts, for use in Los Angeles and throughout Southern California. **J. A. Vandegrift** of the National Lamp Works also attended this important meeting.

F. H. Woodward, manager of the Great Western Power Company, and **Superintendent Heron** had the unpleasant experience of finding, after attending an electrical dinner in San Francisco, that the company automobile which they had left parked on the corner in Oakland had been stolen. Mr. Woodward's private machine, which was parked alongside the company's, was not taken although the latter bore the company's name.

H. A. Barre, electrical engineer for the Southern California Edison Company with headquarters in Los Angeles, has returned from an extended trip to the East, where he has been attending a number of technical sessions of engineering committees of the National Electric Light Association. Mr. Barre has also recently paid a visit to San Francisco, where he has been in important conferences with committee members.

Walter F. Meier, corporation counsel, accompanied by hydroelectric engineer **C. F. Uhden,** Seattle, was in Portland recently, presenting data to District United States Forester George H. Cecil, covering the preliminary work contemplated by Seattle on the Skagit river power project. An outline of just what the city proposes to do at the power plant site and other locations on the Skagit river was presented to federal authorities and it is expected that a permit will be granted in the near future.

Fred E. Buck of Stevensville, Montana, has been appointed engineer for the Montana Irrigation Commission created by the extraordinary session of the Legislature called last summer. Several new districts have been organized under this law that expect to use electric power for pumping. Mr. Buck is a graduate of the University of Montana with the class of 1906, has been city engineer of the city of Missoula, Montana, and has engaged in a wide engineering practice in Western Montana in previous years.

Edward A. Quinn, general superintendent of the San Joaquin Light & Power Corporation, with headquarters at Fresno, California, in conference with P. M. Downing, chief engineer of electric generation of the Pacific Gas & Electric Company, and A. E. Wishon, assistant general manager of the San Joaquin Light & Power Corporation, comprised the committee of three who have just recently decided on the tie-in at Newman, California, between the power lines of the Pacific Gas & Electric Company and the San Joaquin Light & Power Corporation.

Mr. Quinn has been engaged in the electrical business since his boyhood days, and coming West to San Francisco in 1895, was in the employ of the Edison Light and Power Company for a year and a half.

Later he entered the employ of the Standard Electric Company of California, which was one of the first large hydro-electric plants in the West, and assisted in the installation of the machinery in the most important substation on the system and in the completion of the big power house at Electra. He remained with this company four years and in 1905 went with the San Francisco branch of the Westinghouse Electric and Manufacturing Company. In August, 1907, he was tendered the position of General Superintendent of the Nevada California Power Company, with headquarters in Goldfield, in charge of operation throughout the mining camps in the southern part of Nevada, and adjacent territory in California. In 1910 he returned to San Francisco to go with the selling department of the Allis Chalmers Company and he was with this company when he received the offer to join the San Joaquin Light & Power Corporation.

Meeting Notices for Electrical Men

(Among notable meetings in San Francisco during the past two weeks are the dinner of the California Electrical Cooperative Campaign on November 15th, and the meetings of the Engineers' Club and the Contractor Dealers. Important gatherings at Del Monte are announced for the coming week.—The Editor.)

New Officers for Engineers' Club of San Francisco

Officers and directors for the Engineers' Club of San Francisco have been elected for the coming year. Ely C. Hutchinson, manager of the engineering and sales department, Pelton Water Wheel Company, San Francisco, has been chosen president. The other officers are: J. E. Woodbridge, 1st vice-president; Edwin Duryea, Jr., 2nd vice-president; Charles C. Hardy, treasurer; Allen G. Jones, secretary. The new directors are: Bruce Lloyd, Charles E. Townsend, A. E. Chandler, B. P. Legare, Abbot A. Hanks, E. O. Shreve, A. H. Halloran and W. G. Vincent, Jr.

President Hutchinson has nominated the chairmen of the various committees for the ensuing term. The important Admissions Committee consists of Abbot A. Hanks, chairman, representing the and Telegraph Company, Riordan and Roy H. Elliott, representing the mining engineers; Nathan A. Bowers and E. J. Schneider, representing the civil engineers; E. C. Jones and W. W. Hanscom, representing the mechanical engineers; and L. S. Ready and J. A. Koontz, representing the electrical engineers. The chairmen of the other committees are: Finance committee, E. C. Bumsted; House committee, C. C. Brayton; New Membership committee, W. G. Vincent, Jr.; Entertainment committee, A. H. Halloran.

Electrical Contractors and Dealers' Association of San Francisco

An amendment to the by-laws of the Electrical Contractors and Dealers' Association, raising the initiation fee from $100 to $500, was passed at the meeting of November 14th. The new initiation fee is effective January 1st, 1920. At this meeting W. D. Kohlwey reported on the progress of the Retail Advertising Page idea in the San Francisco newspapers. W. F. Brainerd urged the members of the association to attend the "Get-Together Dinner" of the California Electrical Cooperative Campaign, November 15th. L. R. Ardouin, secretary of the association, told of the plans for "Contractors' Day" at the San Francisco Electrical Development League luncheon, November 17th.

At the session of November 21st, it was decided that the conference committee of the association should meet once a week. The necessity for filing of bids on work out of the city was emphasized by President Clyde Chamblin. Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, and M. T. Dolman, manager of sales promotion bureau, Pacific States Electric Company, addressed the meeting on the advisability of electrical contractors advertising as a unit in the daily newspapers, as has already been done in Los Angeles.

Lecture on "Electrical Communication in War Time" by Dr. F. B. Jewett

Dr. F. B. Jewett, chief engineer of the Western Electric Company, spoke on "Some Wartime Developments in Electrical Communication and Allied Fields," in Native Sons' Hall, San Francisco, on Monday evening, November 24th, before an enthusiastic audience of more than 400 people. He appeared under the auspices of the San Francisco section, American Institute of Electrical Engineers.

W. G. Vincent, Jr., chairman of the local section, gave the first words of welcome to the gathering, and introduced C. W. Burkett, chief engineer of the Pacific Telephone chemical engineers; B. M. San Francisco, who acted as chairman of the evening. Mr. Burkett, in presenting Dr. Jewett to the audience, outlined his notable services in both civil and military fields. As Lieutenant-Colonel in the Signal Corps, U. S. Army, Dr. Jewett had an excellent opportunity to observe many phases of wartime activity in the development of specialized electrical apparatus, and contributed much toward perfecting devices to detect hostile submarines. Best known for his work in telephone communication, Dr. Jewett has had a leading part in the development of the remarkable "telephone repeater."

In beginning his address, Dr. Jewett told of the methods used in building up a Signal Reserve Corps before the war, so that at the outbreak of hostilities there were experts ready to set to work in the further development of electrical communications. He paid particular tribute to the efficient labors of Colonel J. J. Carty, who laid out the lines of communication for the American Expeditionary Force in France. High praise was also bestowed upon Colonel A. H. Griswold and the telegraph battalion organized in San Francisco for overseas service.

In the course of his remarks, which were illustrated with excellent stereopticon slides, Dr. Jewett touched on the developments in land communication, especially by telephone and telegraph, and also devoted much time to the radio telephone, with its applications both to aircraft and to submarine destroyers and other vessels of the navy. The detection of hostile submarines by electrical listening devices was also discussed, and mention was also made of the remarkable sound-ranging apparatus evolved by electrical engineers with the allied armies.

Dr. Jewett concluded the evening's instructive program by displaying some moving picture films, made under the direction of the Western Electric Company, showing several of the foremost engineering triumphs of the war.

BUILDERS OF THE WEST — LXVI

LIEUT.-COL. W. B. GREELEY

During the past month the nation from one end of the country to the other has celebrated the anniversary of the signing of the armistice, Nov. 11, 1918. Many important factors contributed to the successful conclusion of the world war, but it is generally admitted that the engineer and his wonderful activities must be given paramount consideration to all others. In this work engineers of the West of the type of Herbert Hoover have written a page in history never to be forgotten. This issue of the Journal of Electricity is affectionately dedicated to Lieutenant-Colonel W. B. Greeley, Associate Forester at Washington, D. C., who is a product of the West and its best traditions. The work of the Twentieth Engineers and the effective accomplishments of the Forestry organization in France, in which Colonel Greeley had a substantial part in organization and direction, is a record of achievement of which the West is justly proud.

San Francisco Electrical Development League

Featuring "Armistice Day," the San Francisco Electrical Development League on November 10th held its luncheon meeting in the Palace Hotel, each member bringing as his guest a man in the electrical industry who had seen service in the World War. The entire program was patriotic in character, and one of the effective "stunts" engineered by F. E. Boyd, chairman of the day, was the introduction of three Boy Scouts, costumed to represent the characters of the well-known painting, "Spirit of '76," who marched about the banquet hall playing patriotic airs while the crowd stood at attention. Captain A. E. Graupner, Captain W. B. Mel and Lieutenant A. J. Callaway were speakers. Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, told of the magnificent fighting of the American doughboy in the Argonne drive.

"Contractors' Day" at the League, on November 17th, drew out a record attendance. A decided triumph was scored by the presentation of the clever comedy, "Take the Offlmug Apartments F'rinstance," from the pen of L. R. Ardouin, secretary of the San Francisco Association of Contractors and Dealers. C. J. Newbery, C. F. Butte, C. B. Kenney, Clyde L. Chamblin, E. E. Browne and Percy Schwartz were the members of the association who enacted the skit, which depicted conditions in the electrical contracting business in "5000 B. C." and later. The contractors were congratulated upon the entertaining program they had furnished for the edification of the League.

Major Volney D. Cousins, equipment specialist, Pacific Telephone and Telegraph Company, spoke on "Some Recent Telephone Transmission Developments" at the League meeting of November 24th. He showed how the unusual transmission problems of the past few years have been solved, using charts and diagrams to illustrate his talk. The development of the "telephone repeater," which makes long distance telephoning possible over almost any length of line, was described, and Major Cousins predicted that through the use of this device country-to-country telephoning will be in the near future a commonplace feature of our daily life. A telephone conversation between San Francisco and Buenos Aires, he declared, could be carried on with ease. Mr. L. J. Brown, assistant sales manager of the Western Electric Company, San Francisco, acted as chairman of the day.

CALIFORNIA ELECTRICAL COOPERATIVE CAMPAIGN DINNER IN SAN FRANCISCO NOVEMBER 15TH

The California Electrical Cooperative Campaign "Get-Together" Dinner, held in the banquet hall of the Commercial Club of San Francisco, on the evening of November 15th, was one of the most successful events of this kind which has ever been held on the Pacific Coast. More than 350 men associated with the electrical industry were in attendance. John A. Britton, Vice-president and General Manager of the Pacific Gas & Electric Company, was chairman of the evening, introducing the speakers with characteristic tact and effectiveness.

At the speakers' table, besides Chairman Britton, sat A. Emory Wishon, Assistant General Manager of the San Joaquin Light and Power Corporation, and President of the Pacific Coast Section, N. E. L. A.; R. H. Ballard, Vice President of the Southern California Edison Company, and President of the National Electric Light Association; Lee H. Newbert, Manager, Commercial Department, Pacific Gas & Electric Company, and Chairman of the Advisory Committee of the California Electrical Cooperative Campaign; E. O. Edgerton, Harvey D. Loveland and Frank R. Devlin, all of the California State Railroad Commission.

Throughout the evening patriotic songs appropriate to the "one year after the Armistice" season were sung by the gathering, and special musical numbers were presented by the Masonic Quartet.

In opening the discussion of problems affecting the industry, Lee H. Newbert told of the work done by the California Electrical Cooperative Campaign during the past year, and predicted even more effective activity during the coming twelve months. He showed how the staff organization of the Campaign had increased, and laid particular emphasis on the importance of the special electrical advertising pages and sections which are to be placed in the chief newspapers of California through the cooperation of the various electrical interests. Continued support of the Campaign forces was strongly urged by Mr. Newbert.

An eloquent exposition of his "Self-Interest Plan for the Electrical Industry" was made by A. Emory Wishon. Much new illustrative material was brought out in the course of the talk, and the whole analysis of the business situation was at once so novel and definite that Chairman Britton, in his after-remarks upon the discussion, termed Mr. Wishon "a Columbus of the Industry." The speaker showed actual charts and plans of the development of the San Joaquin Light and Power Corporation, as indicating the manner in which all the public is going to benefit in dollars-and-cents profit through the furtherance of power projects in California.

R. H. Ballard gave a comprehensive view of the impressions he had gained during his recent tour of the East in his capacity as President of the National Electric Light Association. The electrical men of the nation, he assured the gathering, are watching with much interest the progress of the California Cooperative Campaign. "Forward, California," he said, is the slogan for the year in electrical affairs, and he expressed the confident belief that a great material expansion is before the industry in the next decade. During

A large attendance and great enthusiasm marked the dinner given by the California Electrical Cooperative Campaign in San Francisco on November 15. The dinner was in the nature of a get-together event, and a number of important speakers were on the program.

this period, Mr. Ballard estimated, $250,000,000 would be required to finance electrical development in this State.

E. O. Edgerton, President of the California State Railroad Commission, spoke also of the future of the industry in California, and was inclined to think that Mr. Ballard's figure of $250,000,000 for the extension of the industry within the next ten years was decidedly conservative. The electrical industry, he declared, has before it a great responsibility to the public, which he had no doubt would be met with the same wise management and policy which at present is directing its progress. Mr. Edgerton spoke with gratifying directness as to the desire for friendly relations between the power companies and the regulating commissions which represent the public. The commissions, he made plain, wish the industry to prosper and make a legitimate profit, and he expressed it as his opinion that the public utilities are today the best managed concerns in California, meriting the public confidence.

The meeting closed with the singing of the "Electric Song of San Francisco," to the tune of "Auld Lang Syne."

A. I. E. E., Utah Section

"Modern Illuminating Engineering" was the subject of an address given by A. L. Powell, illuminating engineer in the laboratory of the Edison Lamp Works of Harrison, N. J., before a meeting of the Utah Section, American Institute of Electrical Engineers, at Salt Lake City, November 26.

Meetings at Del Monte

A meeting of the Advisory Committee will be held at the Hotel Del Monte on December 2nd, at 10 a.m. On December 3rd there will be a meeting of the Commercial Committee of the Pacific Coast Section of the N. E. L. A., followed on December 4th, 5th and 6th by a meeting of the Electrical Supply Jobbers. The Executive Committee of the Pacific Coast Section of the N. E. L. A. will also meet at Del Monte on Dec. 5th.

Electrical Contractors and Dealers in Portland

The evening of Nov. 14th, several of the jobbers and dealers handling washing machines and vacuum cleaners met in a preliminary meeting at the Portland Chamber of Commerce for the purpose of organizing a "special section" of the Oregon Association of Electrical Contractors and Dealers. Mr. Scott acted as temporary chairman. The purpose of the organization is to formulate a uniform policy of handling time payment business along these lines.

Representatives of the following companies were present: J. C. English Company, Pacific States Electric Company, Fobes Electric Company, Beaver Electric Company, Stubbs Electric Company, Smith-McCoy Company, and Scott Electric Company.

WESTERN MEETINGS

November 12.—Electrical Cooperative League, Los Angeles. E. Earl Glass, Engineer County Flood Control of the County of Los Angeles: "Flood Control."

November 19.—Electrical Cooperative League of Los Angeles. Jas. W. Foley: "Citizenship."

November 22.—A. I. E. E., Denver Section: "Late Developments in Industrial Store and Residence Lighting," by A. L. Powell, illuminating engineer, Edison Lamp Works, G-E Co., Harrison, N. J.

November 25.—Joint meeting in San Francisco under the auspices of the California Section of the American Chemical Society. Symposium on the Application of Chemistry to Engineering. Professor J. M. Hyde, Am. Inst. M. and M. Engrs., Stanford University; Professor C. G. Hyde, A. S. C. E., University of California; S. Barford, A. I. E. E., San Francisco; C. F. Braun, A. S. M. E., San Francisco; Professor R. E. Swain, American Chemical Society, Stanford University.

December 2.—American Association of Engineers, San Francisco. Dr. Ira B. Cross: "What Kind of Engineers the World Needs." All engineers are invited.

HAPPENINGS IN THE INDUSTRY

ELECTRICALLY DRIVEN SHIP LAUNCHED

The dreadnaught California, sister ship of the New Mexico, launched at Mare Island, California, on November 20th, is electrically equipped throughout, as well as being electrically propelled. There are eight steam boilers, two generators developing 15,000 hp. each, and four 7,000 hp. motors.

Besides supplying her driving power, electricity is used to hoist ammunition, rotate the turrets, operate the fourteen-inch guns, steer the ship, raise and lower the anchor, pump fresh and salt water, operate the machinery in the machine shop, carpenter shop and printing establishment, supply fresh air for ventilation, raise and lower the boats, operate the refrigerating plants, searchlights and radio equipments. In the kitchen electricity peels the potatoes, washes the dishes, makes the ice cream, grinds the meat, mixes the dough, cuts the butter, and acts as a labor-saver in many other ways.

PUBLIC UTILITY TRANSACTION

The Pacific Gas & Electric Company has perfected a preliminary agreement with the Sierra & San Francisco Power Company to lease and operate all the properties of that company for fifteen years. Application will be made to the State Railroad Commission for permission to complete the agreement.

The principal properties and power house of the Sierra & San Francisco company are in Tuolumne county, and it owns a power line to San Francisco, where it supplies the United Railroads with power. The company also owns a distributing system in the San Joaquin valley and operates in Stanislaus and Calaveras counties.

The proposed lease will enlarge the facilities and equipment of the Pacific Gas & Electric Company. Should the Railroad Commission rule favorably, the Pacific Gas & Electric Company will make improvements that the Sierra Light & Power Company has in consideration and probably will make extensions and other improvements in addition.

NEW PIPE INSTALLATION

The Redwood Manufacturers Company of San Francisco have just been awarded a contract by the Butte Water Co. of Butte, Mont., for 24 miles of 26 and 24-in. Remco continuous stave pipe for water supply. This line will run from the pumping plant on the Big Hole River to a connection with the city's system and will be installed in the summer of 1920. The contract amounts to about $400,000.

The awarding of this contract was largely due to the fact that in 1892 Redwood Manufacturers Co. installed a line of Remco continuous stave redwood pipe for the same company, 46,000 ft. in length and 24 in. in diameter from a reservoir in the mountains to a connection with the city's system at Butte. That line operates under 160-ft. static head. One of the peculiarities is that the water is pumped from the streams on the Atlantic side of the continental

divide to a reservoir located on the Pacific side and that the water which, if allowed to take its natural course, would flow into the Gulf of Mexico, finally after flowing through the pipe reaches the Pacific Ocean.

In 1899 the Redwood Manufacturers Co. installed for the Butte Water Co. 64,700 ft. of 24-in. Remco pipe and 32,600 ft. of 26-in., which was an additional supply for the city of Butte. This line runs from the Big Hole river to a connection with the city's system on the outskirts of Butte and is under a pumping pressure averaging 200 ft. static head.

The lines installed in 1892 and 1899 were thoroughly examined in October, 1919, and found to be free from any deterioration whatsoever. The redwood shows no decay and is in its original condition. The pipe lines have never ceased operation for a single day since they were installed notwithstanding the fact that they are located in climate which goes 50 deg. below zero at times.

STREET RAILWAY RULINGS

Authorization of a zone system of fares for the electric street railways of San Diego was decided on by the State Railroad Commission, the decision being the first on record in which the one-fare system for street railways has been departed from in California. The decision lays down several new precedents for the operation of street car lines in the state.

The decision authorizes an inner, or short-haul zone in which fares shall be 5 cents, and an outer, or longhaul, zone, fares to be 10 cents. Interurban fares are readjusted. Ticket books—four tickets at 7½ cents and sixty-ride boods at 6½ cents—are ordered.

Application of the street railway company to discontinue lines in East San Diego and Point Loma is denied, and radical changes in paving laws are recommended to the San Diego municipal government to obviate the necessity for expensive types of paving work by the street car company.

By a unanimous decision of the board of arbitration considering a scale of wages for the car men and other classified street railway employes of the Portland Railway, Light & Power Company, a schedule has been signed for the period from October 1, 1919, to April 30, 1920. Wages of platform men are raised from a maximum of 56 cents an hour to a maximum of 62 cents an hour and that of other classified employes to a scale corresponding with that figure approximately.

BILLS OF INTEREST TO ENGINEERS

The following bills of interest to engineers, now before the Senate and House of Representatives, are listed by the National Service Committee of the Engineering Council in a recent bulletin:

S. 3395, to discontinue the improvement to provide a channel extending from the sea to the Charleston Navy Yard.
S. 3399, authorizing the use of radio stations under the control of the Navy Department for commercial purposes.
H.R. 10433, to provide for disposal of public lands in Arizona, New Mexico, Nevada, and Utah, containing deposits of copper at depth.
H.R. 10453, to provide for the termination of Federal control of railroads and systems of transportation; to provide for the settlement of disputes between carriers and their employes; to further amend an act entitled "An act to regulate commerce," approved Feb. 4, 1887, as amended.
H.R. 10483, to provide for the construction of a waterway from the Ohio River to Lake Erie.
H.R. 10484, to provide for an examination and survey of San Luis Obispo harbor, California.
H.R. 10510, to provide that the United States shall cooperate with the states in promoting the health of the rural population of the United States.
H.R. 10537, making appropriations for the purchase of airplane and aviation equipment for the Aviation Service of the U. S. Army.

NEW PLANT IN ASTORIA

The new plant of the Pacific Power & Light Company which is being erected on the north short of Youngs Bay, will include not only electric power generating machinery, but also a gas generating plant, both of which will be of sufficient capacity to meet the demands caused by the growth of the city for years to come, or until the plant is taxed to approximately three times the present demands.

The completed plant will represent an outlay of approximately $750,000. Present indications are that it will be completed in from six to eight months.

The buildings which will house the electric generating plant will be erected close to the line of the bulkhead which has just been completed, and will be of the usual electric generating plant type, of reinforced concrete construction, and will measure approximately 90 by 100 feet, and 37 feet above grade. A basement in which the boilers and machinery will be installed will be under a part of the structure.

It is proposed to install one 3,000-kw. steam operated turbine generator, capable of producing current up to 11,000 volts. This will be a General Electric Company machine, and practically all the equipment of the new electric plant will be the product of this company. The building will be of sufficient size to permit the installation of additional equipment to produce 5,000 additional kilowatts when the demand requires. The boilers will consist of three 60-hp. boilers of the high-pressure type, and the boiler room will be so constructed as to afford ample room for additional equipment when it is installed.

NORTHWEST HEATING PLANT

The Northwestern Electric Company's steam heating plant is now supplying heat to 90,000,000 cu. ft. of space in office buildings, hotels, etc. They consume 10,000,000 cu. ft. of "hog fuel," refuse from approximately 100,000,000 board feet of lumber. To furnish oil to the buildings served by this company it would take 150,000 bbls. per annum, and 5,000 tank wagons to deliver it. The equivalent in slab wood would be 60,000 cords, and there would be 1,000 loads of ashes.

The Northwestern Electric Company have obtained the contract to furnish all the electric power for the new factory of the Aladdin Building Material Company's plant at Kenton. There will be approximately 300 hp. in the first unit.

TECHNICAL EDUCATION

The Massachusetts Institute of Technology gives the following approximate figures among those listing the number of former students in various lines of industry. The former students number over 14,000, 7,015 being graduates:

	Number	Percentage of Graduates
Civil Engineers	262	.037
Mechanical Engineers	446	.063
Mining and Metallurgical Engineers	361	.05
Electrical Engineers	560	.08
Marine Engineers	44	.0063
Electro-Chemical Engineers	28	.004
With Construction Companies	77	.01
With RR. and Street RR. Companies	322	.046
Heating and Ventilating	21	.003
With Ship and Marine Engineering Works	14	.0021
With Gas Companies	36	.005
With Telephone and Telegraph Companies	45	.0^5
With Electric Companies	77	.0099

It is stated that representatives of the General Electric Company, the Western Electric Company, the Westinghouse Electric & Manufacturing Company, the American Telephone & Telegraph Company and others visit the Institute every year and interview such of the students as are interested in the kind of work they represent.

The research laboratories of the Electrical Engineering Department of the Institute are at present carrying on research for the American Telephone & Telegraph Company. The Institute has yearly contracts with the General Electric Company, the American Telephone & Telegraph Company and the Goodyear Tire & Rubber Company for research work. Besides this the research laboratories do work for the Vacuum Oil Company, the National Tube Company, the National Electrolytic Company and many others.

The Electrical Engineering Department is equipped with full-sized dynamos, so that the students experiment with the same apparatus which they will use in industrial life.

NEW POWER SCHEME ADVOCATED

Establishment of an interstate hydroelectric system by Portland and Vancouver as a means of building up these cities and adjoining communities is proposed by A. L. Haley, an engineer retained by the Port of Vancouver, after a careful study of power development in the middle western and eastern states. Within a radius of 100 miles from Portland, Mr. Haley said, 500,000 horsepower of electric energy can be developed and this would mean wonders in the way of encouraging and building up the industrial life of the two cities.

"There is in the Cowlitz 120,000 horsepower, only 60 miles distant, and 300,000 horsepower in the Deschutes, less than 100 miles away," said Mr. Haley. "In addition there are valuable falls on the Santiam, not to speak of the enormous strength in the falls of the Columbia at Celilo, where government figures show a mean annual average of 300,000 horsepower available.

"If it could properly be brought before the people of Portland and Vancouver, so they would understand the benefits they would receive from utilization of the waterfalls, there would be no trouble in getting a bond issue of $25,000,000.

"I am told it costs Portland $12,000 a day for its fuel and electric current, or $4,980,000 per annum. Much of this could be saved by supplying ourselves with electricity for all purposes. Water power developed on public grounds by private individuals or private corporations must pay a government tax for the use of the water, gauged at 10 cents per horsepower per year at the beginning and increased to $1 per horsepower per year in ten years.

"Water power developed by municipalities pays no tax at all, so if Portland and Vancouver districts should issue bonds and develop, say 500,000 horsepower, the city would be saving $500,000 a year in government taxes, in addition to its citizens getting their electricity at cost.

"I suggest that Portland people unite with the citizens of Vancouver and build an interstate power plant of sufficient magnitude to serve the requirements of both cities."

SOUTHERN CALIFORNIA EDISON COMPANY BOND ISSUE

To secure funds to carry out development projects made necessary by the hydroelectric situation in Southern California, the Southern California Edison Company has applied to the Railroad Commission for authority to issue bonds to the amount of $7,500,000. Of this amount $1,842,000 is to be used to reimburse the company for expenditures already made for the construction, completion, extension and improvement of its facilities and for the improvement and maintenance of its service. The balance is to be expended from time to time as the needs of the company demand.

It is proposed to sell the bonds at not less than 93 and interest. They are to be listed as general and refunding mortgage 6 per cent, twenty-five-year gold bonds of the series of 1919.

In a supplemental petition filed by the Edison Company the Commission is asked to amend a previous order so as to permit an exchange of debentures at par for bonds at 97, the amount involved totaling $1,977,000. The amendment is made necessary, says the company in its petition, by the apparent unwillingness of the debenture holders to exchange the debentures for bonds, par for par.

NEW PLANT FOR STOCKTON

A $5,000,000 plant to manufacture a new four-pull tractor will be erected in Stockton by the Kroyer Tractor Manufacturing Company. Construction of the plant will begin in the spring and operations within a year.

The plant will cover eighty acres at the eastern edge of the city on the Cherokee lane. The first season's output will be 1500 tractors, it is estimated.

The buildings will be modern, designed according to the latest ideas. The layout of the buildings has been so arranged that additional units may be added from time to time.

TRADE IN DYESTUFFS

The following announcement comes from the War Trade Board Section of the Department of State:

The War Trade Board Section of the Department of State is now prepared to make allocations providing for the importation of German dyes (other than vat dyes) in amounts sufficient to supply the requirements of the consumers of the United States for the six months' period, November 15, 1919, to May 15, 1920.

Allocations will be made only when the articles desired to be imported are unobtainable from United States sources, or, though obtainable from United States sources, are unobtainable on reasonable terms as to prices, quality and delivery.

Importations of these articles will be governed by rules and regulations which will be announced as soon as the necessary details have been completed. In the meantime, dye consumers are requested to file with the War Trade Board Section, as soon as possible, applications and undertakings on forms which will be supplied on request, by the Bureau of Imports, War Trade Board Section, Washington, D. C., in which will be stated estimates of the amounts of the above mentioned dyes which will be required for consumption during the above mentioned six months' period.

WHAT MANUFACTURERS ARE DOING FOR CHRISTMAS

A page of electrotypes designed by the General Electric Company especially to assist dealers in their Christmas sales campaigns.

Two pages from the Hotpoint book of Christmas plans. The new folder which is shown at the left carries the idea of the Electrical Christmas to the Christmas shopper.

NATIONALIZING ELECTRIC POWER IN GERMANY

A law nationalizing the electric power of the German Empire has been published by the government. Germany has over 4,000 power establishments, and the splitting up of their activities is held to cause serious waste. The scheme is made imperative by the loss of the Saar coal fields and the obligation to supply coal to the Allies. The water power, which is mostly to be found in South Germany, is primarily to serve local industries, but an agreement will be made with those generating electricity from coal in central Germany. Power stations belonging to states and municipalities will not be disturbed, but the large plants belonging to private capital will be taken over and nationalized by the central government. The government will buy up shares, so that the present organizations can remain intact. The nationalized works are not to be considered as a source of revenue, as the government holds that cheap power for industry is more important than fiscal interests. The private capital in electrical power works in Germany is estimated at 1,000,000,000 marks and the use of electrical power in that country has increased from 4.43 billions of kilowatt-hours in 1907 to 22 billions in 1917.

ELECTRICITY FOR RECONSTRUCTION IN FRANCE

The coal shortage in France continues to be serious though some relief has been afforded by the arrival of American coal. Dispatches from Berlin indicate that the Ruhr region is about ready to deliver coal to France and that about one million tons may be expected the first month. Discouraging reports have been made by the Mining Society of Lens after investigating the damage inflicted by the Germans on the Lens collieries. Eighteen months will be required to pump out the water, according to their estimate, and work cannot be resumed even on the copper seams until the end of 1920. They will not be in condition to produce on their normal-pre-war scale for ten years. The water is oozing out from the lower level mines and causing much damage to the countryside. Powerful electric pumps, which will obtain their power from the generating station at Harnes, have been ordered for the work of clearing the mines.

Every time a nation feels the pinch resulting from a shortage of coal and a dependence on foreign sources for this essential, a stimulus is given to the development of the internal hydroelectric resources. A bill has been submitted to the Chambre des Deputes providing for the utilization of the water power of the River Rhone. Twenty hydroelectric power stations are proposed in the bill, to produce an average of 715,000-hp. each. It is estimated that this would be equivalent to 5,000,000 tons of coal annually, or nearly one-eighth of the French coal output before the war. Fifteen years would be required for this work and the expenses are estimated at $500,000,000. The proposition as it now stands is to grant a concession for the whole undertaking to a company with a capital of $50,000,000 and the privilege of issuing bonds to ten times that amount. The bonds would be guaranteed by the state, which would appoint two-fifths of the membership of the administrative council, including the president.

ELECTRICAL GOODS FOR ARGENTINA

A most promising future for American electrical goods exists in Argentina, Brazil, and Uruguay, according to a report just made to the Bureau of Foreign and Domestic Commerce, Department of Commerce, by Trade Commissioner Philip S. Smith. The use of electricity is widespread in all three countries.

In Argentina and Uruguay the high cost of imported fuel and the lack of water power limit the use of electricity to some extent, but in Brazil the immense amount of water power available makes the electrical field a peculiarly attractive one to manufacturers of electrical equipment. As this water power is found for the most part in the coastal section of the country, it will be available for industrial enterprises and for general lighting, heating, and power purposes in the numerous cities of this section, which includes the greater part of the population of the country.

COPPER WIRE TRADE

"Foreign and domestic orders for wire, and copper goods generally, are increasing rapidly," says a prominent manufacturer long connected with the trade. "Orders from Europe and South America show great increase lately. Old-established European firms of the highest repute are especially desirous of obtaining agencies for American goods. This, in my opinion, is one of the most encouraging features other than the rapid increase in orders accompanied by highest New York credit.

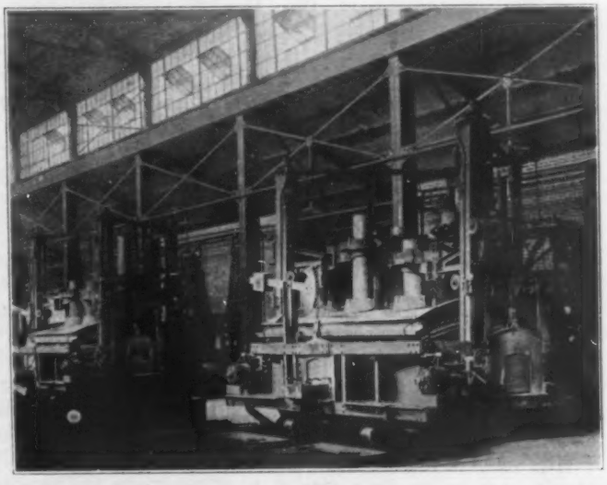
"This anxiety to obtain agencies is partly due to the fact that companies are slightly more lenient in regard to credits when an order is booked by an agent than when sent in direct. But the main reason appears to be anticipation of large business about to be done with America, especially in copper wire products.

"Domestic orders are increasing, but not quite so rapidly as bookings for foreign account. Good weather fixes the time of most wire installations, and normally good weather ordering is much larger than winter ordering. Labor troubles have held up such ordering greatly this summer. But now orders are being forced through by press of need in goodly amount."

ELECTRIC STEEL MAKING

With further reference to the article by Harry Etchells appearing in the October 1st issue of the Journal of Electricity, the Electric Furnace Construction Company, Finance Building, Philadelphia, the manufacturers of the "Greaves-Etchells" electric furnace, send a supplementary statement to the effect that the typical "Greaves-Etchells" electric furnace described in that article is of 6 tons rated capacity—although charges as high as 9 tons have been made in the furnaces. The copper plate to which is attached the third leg of the electric power supply simply lies on the inside of the furnace body, and the lining is rammed solid on top of this. There are no projections either of copper, steel or carbon through the furnace lining, and the linings have been proved to be extremely strong and durable.

Furnaces of this type are at present installed at the Mare Island and Puget Sound navy yards.



A typical installation of the Greaves-Etchells electric furnace which was described in detail in the October 1st issue of the Journal of Electricity.

POWER AND IRRIGATION PLANS

Irrigation and water power developments contemplating a total expenditure of more than $11,440,000, and including irrigation projects for 214,110 acres of land in Northern California, are included in the applications for permits to appropriate water, filed with the State Water Commission recently.

Among the power plant petitions is that of the Western States Gas and Electric Company of Stockton, which asks to take water from the south fork and from the north fork of the American river for power purposes. The San Joaquin Light & Power Corporation of Fresno asks permission to take 900 cubic feet a second from the San Joaquin river, through diversion works, the cost of which is estimated at $4,000,000.

The Mokelumne River Power and Water Company of San Mateo also asks extensive permits for use of water for power purposes. The estimated cost of diversion machinery at the south fork of the Mokelumne River is $186,000, at the north fork, $502,500; at the middle fork, $600,000; the Esperanza creek spillway, $25,000; and at the south fork tributary, $650,000.

Among the irrigation projects is a proposal of the Santa Cruz County Farm Bureau, which asks permission to appropriate waters from Soquel creek, Bonciforte creek and San Lorenzo river to irrigate 12,000 acres. The Modesto Irrigation District asks a permit to take water from the Tuolumne river, to use on 100,000 acres, through the Don Pedro storage reservoir. The estimated cost of this work, according to the permit application, is $3,100,000 for dam and reservoir, with other expenditures due for power and development.

The Mendota Irrigation District, Fresno County, asks permission to take water from Fresno slough, the north fork of the Kings river, to irrigate 87,118 acres, estimated cost of flumes and other facilities to be $500,000, according to the petitioners' estimate.

Roger W. Olmstead, Manteca, seeks permission to divert water from the San Joaquin, by diversion works, through the Littlejohns creek tributary in Calaveras County, estimated cost $750,000, the purpose to be electrical power. He files a similar application for the waters of Black creek, tributary to the Stanislaus river, estimated cost $1,250,000, also for power purposes.

Besides these applications forty-one more are before the water commission, including applications for smaller farm irrigation projects and a number of applications for supply of power expansion in the southern part of the State.

ELECTRIC PASSENGER SHIPS FOR PACIFIC COAST

The installation of two 19-knot passenger vessels equipped with the turboelectric drive in the service between San Francisco and Los Angeles has been planned by a group of New York shipping men, according to advices recently received. The telegraphic announcement states that machinery is now being installed, and the vessels will be on the Pacific the latter part of April.

Shipping men who heard the announcement were not surprised to learn that the vessels will be electrically driven, for it is known that a number of steamship concerns have prepared tentative plans for the construction of the new type of passenger ships.

It is known that one of the local shipbuilding concerns is negotiating for the Pacific Coast rights to manufacture and install turboelectric units and that it is planned to have several vessels of this class built here during the next year.

The attention of the owners and builders to the electric drive was attracted by the success attained with the collier Jupiter and the super-dreadnaught New Mexico, both vessels having been in use long enough to demonstrate the practicability of the motor-driven craft.

MACHINERY IMPORTS IN JAPAN

According to the Osaki Mainichi, orders from Japan for British or American machinery are very large at present. The demand is said to be concentrated on machinery pertaining to electricity, electric light and electric trams, steam boilers and spinning machinery. As regards the increase in the demand for electrical machinery, it is due to the development of communications and industry and also to the large increase in the price of coal. On the other hand, many capitalists who intended to import machinery for the enlargement of their business during the war, but hesitated on account of the enormous rise in the price of iron, have now made up their mind to import, as they have realized that prices will not decrease for some time to come, in view of the present labor and other difficulties pravailing in Europe.

TRADE NOTES

New Electrical Firm —

Saxe & Hussey have opened an electrical appliance store at 315 Pine street, Seattle. Aside from serving the local trade it is the intention to enter the export field, including Australia, New Zealand, China, and Japan in the territory to be covered. Victor L. Saxe, one member of the firm, has been with the North Coast Electric Company at Seattle for the past five years. Kenneth P. Hussey, the other member, has been with the State Bank of Seattle for the past four years with the exception of nine months during the war, when he served in the signal corps and gained considerable experience in electrical matters. He is to handle the export end of the business while Saxe will have charge of the electrical appliance end.

Offices Re-opened —

The Richardson-Phenix Company, lubrication engineers and manufacturers, Milwaukee, Wis., have re-opened their Philadelphia offices in the Bailey Building under the management of George F. Fenno.

Western Offices —

The Safety Insulated Wire and Cable Company has opened offices at 616 Title Insurance Building, Los Angeles, in charge of E. H. Bill.

New Store —

A new store known as the Community Electric Shop is to be opened in San Francisco by George W. Brouillet and Chas. Fries, formerly of the Electric Railway & Manufacturers' Supply Company, and the Liberty Electric Company, respectively.

New Contract —

The Northwestern Electric Company have signed a contract for the power required to operate the new Olympic Feed and Serial mill of the Portland Flouring Mills Company. The amount of power required at once is approximately 600 hp.

Window Dressing Campaign —

The Edison Lamp Works are putting on a special window dressing campaign in San Francisco of Edison white mazda, black tissue and white lamps.

Court Decision —

In the suit of Harvey Hubbell, Inc. vs. the General Electric and Bryant Electric Companies, for infringement of Hubbell Patents Nos. 774,250 and 774,251 covering attachment plugs, decisions have been filed by Judge Thomas in the United States District Court, upholding the Hubbell Patents and finding infringement thereof. In the suit of Bryant Electric Company vs. Harvey Hubbell, Inc., charging infringement of their Burton Patent, a decision has been filed by Judge Thomas in favor of the defendants. finding the Burton Patent invalid.

NEW ELECTRICAL DEVELOPMENTS

(In line with the growing interest in better illumination for the factory as well as for the home is a new reflector with a luminous top. Other recent items in industrial development are a drum controller for locomotive motors, a special line of bell-ringing transformers, an electrical letter-opening device, and a new farm lighting equipment.—The Editor.)

IMPROVED REFLECTOR UNIT

The new luminous top reflector put on the market by the Benjamin Electric Manufacturing Company, is designed to give a soft light in the upper part of any room, at the same time improving the light on the working plane.

This new reflector unit gives out through a semi-translucent top a diffused light to the upper part of the room, thus utilizing the ceiling as a reflector.

Considerable attention is being given at this time to better lighting in industrial plants, and its influence upon efficiency. It is claimed that this reflector gives the effect of increased height to a room, thereby producing a sense of greater freedom of action among the workers. A small increase in the diffusion of light is noticed, sharp contrasts are reduced, and a better quality of illumination results.

Where line shafting and pulleys are present in the upper part of the room they are thrown into relief by the luminous top device, the liability to accident among those attending to repairs being thereby greatly decreased.

DRUM CONTROLLER FOR LOCOMOTIVE MOTORS

A drum type controller for series-parallel control of two series motors is one of the new products of The Cutler-Hammer Mfg. Co., of Milwaukee, Wis. This controller, which is provided with both a main cylinder and a reverse cylinder, is for use on storage battery locomotives using 250 volts or less.

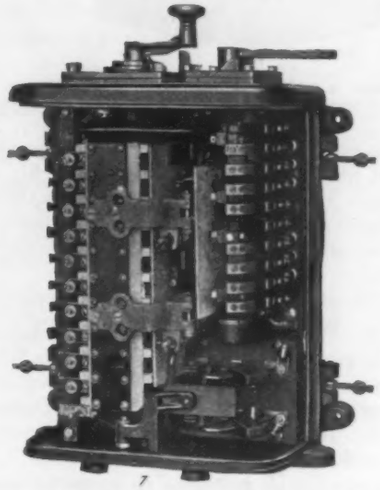
The motors are accelerated by the main cylinder, which has seven points of control. A star wheel provides an interrupted motion to the lever, so the operator readily feels the speed points. The fourth point is the full series or low speed running point and the seventh the full parallel or high speed running point. All intermediate points are resistance points. The Wheatstone Bridge method is used for transition from motors in series to motors in parallel between the fourth and fifth points of control, and as the circuit is not opened, continuous torque is obtained during the transition. Arc barriers are provided between each contact finger, and strong magnetic blowouts prevent excessive arcing.

The reverse cylinder is positively interlocked with the main cylinder so it cannot be operated when the latter is in any but the "off" position. The fingers of the reverse cylinder are therefore not used for making or breaking the current; hence the contact parts will last indefinitely, and magnetic blowouts are unnecessary.

Two cutout switches allow either motor to be by-passed, if it becomes damaged in any way, and the locomotive operated by the other motor until repairs are made. When one cutout switch is thrown to by-pass its corresponding motor, mechanical interlocks prevent closing the other cutout switch or operating the main cylinder beyond its full series position, thus eliminating the possibility of a short circuit.

A dust-tight and weatherproof construction is obtained by fitting the sheet metal cover under a ledge in the top and providing a rubber gasket between the edges of the cover and the cast iron frame.

This new controller has the following features of construction common to other C-H Drum Controllers: cast iron sections of cylinder clamped on square insulated shaft, using no keys or taper pins, thus making removal easy; cylinders readily removed from case by merely taking off top plates;



A new two-motor battery locomotive controller recently developed by Cutler-Hammer which has all parts liberally proportioned and readily accessible.

steel contact fingers of main cylinder mounted on square insulated metal shaft, which can be removed by taking out two cap screws; all fingers provided with drop forged copper tips of the non-stubbing type.

The contact fingers and segments may be adjusted or renewed without removing the cylinders from the drum case. Those on the reverse cylinder are exposed by merely loosening two thumb nuts and throwing back the blowout plate and arc barriers.

Most mine duty apparatus is employed where the service conditions are severe and delays in operation costly, consequently this new controller has its parts very liberally proportioned to prevent wear and breakage, and those parts which do wear are made accessible and easily renewable.

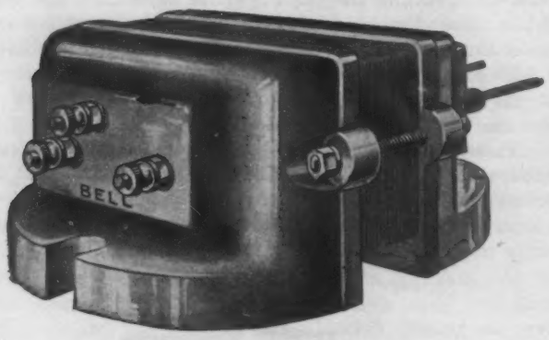
BELL TRANSFORMERS

A complete line of bell ringing transformers with blue glazed porcelain cases is being put on the market by the Standard Transformer Company of Warren, Ohio.

The heavy duty types, for apartments, school houses, and factories are 50-watt capacity with 6, 12 and 18 volts on the bell side. This lends a flexibility to this type of operating both short and long bell circuits from the same instrument. This condition is frequently met in this class of service, but never on residence bell circuits.

Formerly, this type was made with a cast iron case which has now been replaced with a blue glazed porcelain cover.

The company claims the porcelain clad types have advantages over the iron box or metal case types as the porcelain will not rust nor corrode, is an excellent insulator, is non-resilient, hence muffles the hum or buzz inherent in alternating current devices, and as applied to their transformer is pleasing in appearance, light in weight and mechanically rugged.



This transformer is made to produce pressures of the correct values where long and short bell circuits require different electric pressures

The cores on both the residence and heavy duty sizes are made of silicon steel, the coils are thoroughly impregnated and the cases are compound filled, which makes the transformers weatherproof, hence not injured by being installed in a damp basement or other places where they may be exposed to moisture.

WIRELESS RECEIVING SET

The Halcun Radio Co., San Francisco, is putting out a specialty in the way of a complete wireless receiving set with a range of about 200 miles. This set is absolutely self contained, having every necessary feature as well as complete instructions.

It makes an ideal gift for a youngster of about fourteen or fifteen. The retail price is only fifteen dollars.

ELECTRICALLY-DRIVEN MACHINE FOR OPENING LETTERS

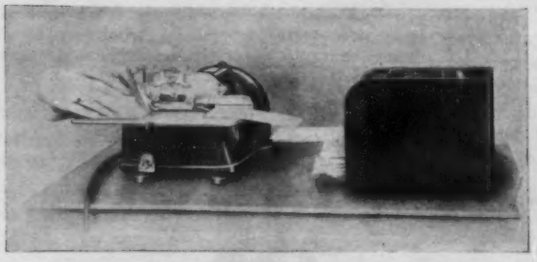
Opening mail at the rate of five hundred letters a minute, a mere fraction of the time occupied by the paper knife, a small electrically-driven machine is proving a highly effective builder of efficiency in business offices by saving money, time, labor and patience. With this machine, one person can open the mail in less time than five or more by the old method, and with greater safety and accuracy. Not only is confusion thereby reduced to a minimum, but responsibility is unquestionably centered.

This machine built by the Bircher Company and known as the Lightning Letter-Opener, occupies but little space and can be placed on any table, desk or counter, all litter thereby being confined to a restricted area.

Attached to an ordinary lamp socket, it is set in motion, by a mere snap of a switch, through the medium of a Westinghouse motor mounted within the case and consuming an amount of power so small as to be almost negligible.

Mechanically, the machine is so simple of construction that not only are repairs reduced to a minimum, but any person of ordinary intelligence, after two or three minutes' practice, can operate it proficiently.

The envelopes are placed on the feed table in a stack of forty or fifty at a feeding, and are conveyed automatically one at a time, by a feed belt, through two rapidly revolving circular knives which cut a very small shaving from the exposed edge of the envelope. The letters are then carried automatically into a stacker.



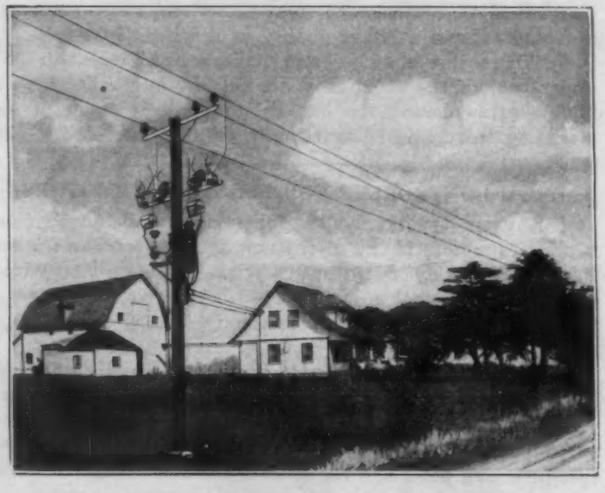
An electrically operated letter-opener which will handle mail at the rate of five hundred letters a minute

As the typewriter replaced the steel pen in the commercial world, so is the letter opening machine taking the place of the paper knife.

FARM POWER AND LIGHTING EQUIPMENT

Utility managers whose property is adjacent to rural communities have many opportunities for farm line service. The fact that farmers will invariably pay for the cost of lines makes this type of service attractive and the volume is increasing.

The Delta-Star Electric Company, Chicago, have developed a new type of equipment which incorporates the essential requirements of a complete switching, fusing, choke coil and lightning arrester element which can be installed at a reasonable cost.



The increased use of electricity in rural districts is leading to numerous developments for farm power supply. It is claimed that this installation is especially safe, simple, and inexpensive.

The two-pole switch is operated from ground level and the fuses so located that they can safely be replaced by the farmer and either steel or wood pole mounting can be used.

The claims made for this new equipment are safety, reliability, simplicity and a low installed cost.

A special article on arc-welding will be a feature of the next issue of the Journal of Electricity.

Books and Bulletins

Dealers' Helps

The Hotpoint Division of the Edison Electric Appliance Company has sent out a special window display for the Christmas season, also a well designed booklet on silver-plated tea and coffee sets and a general catalog. The Hotpoint window display cut-out consists of a center panel, 23 inches wide x 30 inches high, with a hinged wing side piece, 15 x 30 inches, on each side, size over all 53 x 30 inches. The center panel has an opening 12 x 15 inches providing a niche with a very substantial floor on which nearly any one of the Hotpoint appliances may be displayed.

An ordinary Mazda bulb may be inserted behind the display to cast a brilliant light upon the appliance displayed in the niche. This provides a very effective and attention compelling means of displaying the highly polished nickel appliances of the Hotpoint line.

The Hughes division of the same company issues a very useful 47-page booklet entitled "Hughes Electric Range Sales Service Manual," which gives a full discussion of the electric range from the merchandising point of view, with samples of publicity and very helpful suggestions for campaigns.

School of Electrical Engineering and Radio Telegraphy

The Department of Education of the Young Men's Christian Association, Portland, Oregon, has issued a bulletin giving general information and schedule of activities of its schools of electrical engineering and radio telegraphy in Portland. The purpose of the school is to provide a short cut to engineering practice, and to offer a thoroughly practical and complete course of engineering to the man who does not find it possible to spend the extra years and money required in the usual high school and college process.

The bulletin, which is very well arranged, gives an outline of all courses, with tuition fees entrance requirements, etc. Pictures and descriptions of the school buildings and laboratories are also included. The whole undertaking is an enterprising and practical one, which should be of great assistance to technical students.

University Publications

The following publications from the College of Agriculture of the University of California have recently been issued by the University of California Press:

Cow-Testing Associations in California, by Edwin C. Voorhies; Pruning Young Deciduous Fruit Trees, by Warren P. Tufts; Plum Pollination, by A. H. Hendrickson; Seed Treatment for the Prevention of Cereal Smuts, by W. W. Mackie; Investigations With Milking Machines, by F. W. Woll; Mariout Barley, with a discussion of barley culture in California, by G. W. Hendry.

The Electrical Engineering Department of the Massachusetts Institute of Technology publishes a paper by Waldo V. Lyon on "Current Distribution in Armature Conductors," and one by A. E. Kennelly and Edy Velander on "A Rectangular Component of Two-Dimensional Alternating-Current Potentiometer."

The University of Illinois Bulletin No. 110 is "Passenger Train Resistance," by Edward C. Schmidt and Harold H. Dunn.

The Throop College of Technology publishes a bulletin on "Scientific Education in a Democracy," a symposium held at the meeting of the Pacific Division of the American Association for the Advancement of Science at Throop College of Technology.

Mining Machinery

The Allis-Chalmers Manufacturing Company of Milwaukee, Wis., publishes two well-designed booklets—one on a prospecting mill for free gold ores and another on stamp mills and accessory machinery for free-milling gold ores. The latter is extremely well illustrated and includes much valuable information. The same company also sends out a booklet on steam turbine blading, containing illustrations, charts, and inclusive data.

The Eight-Hour Day in the Home

"The Eight-Hour Day in the Home" is the title of a very attractive booklet issued by the Western Electric Company to present the labor-saving electrical devices which are being manufactured for use in the home. Each page has an artistic two-color photograph showing some electrical household appliance in actual use in the home, and underneath a brief discussion of the conveniences of that particular appliance. The whole effect is extremely pleasing, and the booklet is a very convincing piece of advertising.

New House Organ

The "Ermsco" News is the title of the new house organ of the Electric Railway & Manufacturers Supply Company, San Francisco.

In eighteen mimeographed sheets, it comprises a number of brief to-the-point news and trade notes, with personal mention and items in lighter vein. We wish the paper the best of success.

Radio Tests by Bureau of Standards

The Bureau of Standards has issued a list of radio publications and a statement of the work which the radio laboratory of this Bureau is equipped to do in the calibration and testing of radio instruments of various kinds. For such work a nominal fee is charged as stated in the test fee schedule. Arrangements are made for reduced fees to amateurs for the calibration of wavemeters. Electron tubes are among the items upon which the laboratory is equipped to make tests.

All articles submitted for test must be accompanied by a written request for the test. The request should enumerate the articles, giving the serial numbers or other identification marks of each, and should state explicitly the nature of the test desired. It is also desirable that the conditions under which the apparatus is used be stated.

In submitting radio apparatus, the accompanying letter requesting the test should state specifically the nature of the test desired, giving, in the case of wavemeters, condensers, etc., the number of points on the scale and the frequencies of wave lengths at which the apparatus is to be tested. In the absence of specific instructions, such tests will be performed as are necessary to determine the ordinary constants or operating behavior of the apparatus. Thus, for a wavemeter, variable condenser or inductor, the results obtained would make possible the use of the instrument as a secondary standard.

For special tests involving measurements not specified in the schedule, a charge will be made based upon the time required for the test. When the test is one regularly provided for in the schedule the fee may be computed in advance and should be sent at the time the apparatus is shipped.

The radio laboratory of the Bureau of Standards also issues a number of printed publications on radio subjects. In addition to these printed publications there are issued special laboratory reports covering the work recently completed on which no printed publication has been issued.

NEW ELECTRICAL DEVELOPMENT

(Bond issues for important city improvements and a number of new plant constructions are reported from the Northwest. Pacific Central district is going ahead with its extensive irrigations plans. Large engineering plans are under way in the Southwest, while the Inter-Mountain district is making a number of street railway and lighting improvements.—The Editor.)

THE PACIFIC NORTHWEST

TACOMA, WASH—City council has ordered an ordinance prepared calling for ornamental lights on North D street.

NELSON, WASH.—This city is considering the matter of establishing its own utilities, particularly light and water.

PETERSBURG, ALASKA.—The city council has acquired a site for a $75,000 hydro-electric power plant near that city and hopes to at once build a plant of 5000-hp. capacity.

SEATTLE, WASH.—Board of Public Works awarded contract to Roth, Mills & Company, 1933 First Avenue South, for 8250 feet of cable 13-16 inch for James street car line at $2338.87.

SEATTLE, WASH.—Contract for furnishing three 5000-kva. transformers at $24,750 for use at Cedar Falls extension of the city light plant has been awarded to Allis-Chalmers Manufacturing Company.

ROSEBURG, ORE.—The proposal of bonds in the sum of $500,000 for constructing a municipal light and water plant will probably be up for decision at the coming special election.

VANCOUVER, WASH.—Petitions have been circulated in the business district asking that a new system of lighting be inaugurated, cluster lights to be installed on both Main and Washington streets.

PORTLAND, ORE.—All the technical employes if the city of Portland will receive an increase in salary in the near future, as the special election increasing taxes two mills carried by a good majority on the 10th.

SEATTLE, WASH.—The Rainier Electric Company, 118 Spring street, Seattle, is doing the complete electrical wiring in the plant of the Columbia Grafanola Company in the Maritime building, contract amounting to about $4000.

PORTLAND, ORE.—The new quarters of the Pacific International Livestock Show at North Portland will be opened for the first time on the 17th, the arena being the largest in the world, it being erected at a cost of $250,000.00, raised by popular subscription.

CHEHALIS, WASH.—It is estimated that the proposed new street lighting system for the business center here to be of steel or concrete standard with single globe and 400 watt lamp enclosed will cost $1.25 a front foot. Extensions will also probably be made to Main street and Chehalis avenue.

CENTRALIA, WASH.—Surveying the ground and laying out the site preparatory to the erection of the steam plant of the Sherman County Light & Power Company is under way, same to cost when completely installed about $150,000. Machinery which was formerly intended for a steam plant at Lewiston, Idaho, is on hand.

EVERETT, WASH.—Complete electrification of the Eclipse lumber mill at Everett, Washington, and construction of additional finishing facilities that will double the output of the same are contemplated in improvements now under way. Cost of the building expansion exclusive of machinery, totals $25,000. With the completion of the new building and production started in it, it is proposed to electrify the remainder of the mill equipment now in operation under steam power.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company is taking steps preparatory to carrying on a campaign with other concerns to induce the people of Seattle to install porch lights where they do not have them and to burn them all night, showing them how small the cost of the current would be in proportion to the benefits derived if enough people could be induced to join the movement. It is thought possible that the city light department may be induced to join the movement and make an effort toward inducing its patrons to keep their porch lights burning.

SEATTLE, WASH.—Charles C. Moore & Company, L. C. Smith building, Seattle, are building a new turbine plant for the Bloedel-Donovan Lumber Company at Bellingham. There will be a reinforced concrete building, one 2,000 and one 1000-kw. turbine. They have taken a contract to sell three 500-hp. Stirling boilers to the West Lynn plant of the Crown-Willamette Paper Company at West Lynn, Oregon, and to install two of the same sized boilers for the plant at Ocean Falls, B. C., also two 500-hp. boilers for the E. K. Wood Lumber Company at Bellingham, Washington. They are to install for the Union Meat Company at Portland a 500-hp. Babcock & Wilcox boiler and two 500-hp. Babcock & Wilcox boilers for the Granby Consolidated Mining & Smelting Company at Granby, B. C.

SEATTLE, WASH.—NePage, McKenny Company, electrical engineers, contractors and manufacturers, with offices in the Armour building, Seattle, and at Portland, San Francisco and Oakland, report business very active. They are installing complete electrical equipment for lights and power in the Mallory apartments, at 47th street and 14th avenue, Northeast Seattle, and installing complete electrical equipment in the new store building of John Graham at Second avenue and Pine street, Seattle. They have practically completed installation of the electrical equipment at the schools in Bremerton and Charleston, Washington, and in the Togo hotel at Bremerton. They are installing complete electrical equipment in the infirmary building and addition to the female ward, Northern State Hospital at Sedro Wooley, Washington, and have practically completed work in the new high school at Hamilton, Washington. They are now installing stage lighting, border lights, foot lights, strip lights, announcement letters and dimmers in the Liberty theater at Wenatchee, Washington. In their shops at Seattle they are making up the electrical stage equipment for Pantages theater in Los Angeles, Pantages theater in Salt Lake City and the Mercy theater at Yakima, Washington, also consisting of panel boards, switch boards, announcement letters and dimmers. Panelboards, switch boards and cabinets are being made for the White River Lumber Company at Enumclaw, Washington.

THE PACIFIC CENTRAL DISTRICT

HAYFORK, CAL.—Farmers of Hayfork valley have subscribed $1000 to a fund for employing a surveyor to make a preliminary survey for the proposed Hayfork irrigation district.

VALLEJO, CAL.—Public works officers and employes at Mare Island are working on plans for the proposed $1,000,000 wireless plant to be erected near the officers' quarters the coming year.

RICHMOND, CAL.—A building permit has been issued to the Great Western Power Company for a concrete sub-station at the corner of Pullman Avenue and Cutting Boulevard, to cost $4,100.

MODESTO, CAL.—J. Soukas was awarded the contract for enlarging and lining the Modesto Irrigation District's main canal from Mill Gulch fill to the secondary gate, a distance of nearly a mile, at $49,200.

BAKERSFIELD, CAL.—Sealed bids will be received up till Dec. 1st for the franchise to maintain, operate and construct a system of gas pipes, pipe lines and appliances for carrying gas for lighting, heating, industrial and other purposes.

SAN FRANCISCO, CAL.—The Independent Wireless Telegraph Company, Incorporated, with headquarters in New York, has established division headquarters at 110 Market street, with service stations at Seattle, Portland, Los Angeles and Honolulu.

SONORA, CAL.—The trial of the Yosemite Power Company versus City of San Francisco came to a close, the jury awarding the power company $8,800 as a settlement for 80 acres of property involved in the Hetch Hetchy project belonging to the Yosemite Power Company.

LINDSAY, CAL.—The assessments levied by the board of directors of the Lindsay-Strathmore Irrigation District for the year 1919 are now due. The first installment of one-half the assessment will become delinquent on December 29, 1919, and the last payment is delinquent June 28, 1920.

MODESTO, CAL.—Permits have been issued to the Modesto Gas Company for the construction of $74,450 worth of new improvements, as follows: Gas building, $2,000; gas holder, $27,000; boiler and accessories, $7,750; gas generator, $9,000; purification apparatus, $6,000; accessory equipment, $1,700, and water plant $1,000.

ALTA VISTA, CAL.—The new owners of the Cheney ranch are building a dam which will be the largest in this part of the country. It is located four miles from the big Panoche. It is reported that the contract has been let for the hauling of two hundred and fifty tons of coal which will be used to run the steam shovels used in the excavations.

OAKDALE, CAL.—Data for the Melones dam site has been prepared for submission to the state engineer and bond commission in accordance with the requirements of the law, and request has been sent in for additional information to the Oakdale Irrigation District. The district is also seeking to get a line on the power possibilities of the Melones site and hopes to develop some power there.

SAN FRANCISCO, CAL.—Application has been filed by H. L. Shannon, San Francisco, for 200 cubic feet per second from Deer Creek in Tehama county, tributary of Sacramento River, for power purposes. Diversion works consist of a concrete dam 6 feet high, 100 feet long on top and 75 feet long at bottom; and a ditch and flume 10 miles long. The total amount of power to be developed is 22,700 t.h.p., and the estimated cost, $500,000.

CHICO, CAL.—Application has been filed by Dennis Murphy, Chico, for 6,000 miner's inches from Deer Creek, Tehama county, tributary of Sacramento River, for power purposes. The water is to be diverted by means of a concrete dam 30 feet high, 60 feet long on top, and 30 feet long at bottom, and a canal, flume and tunnel 12 miles long. The total amount of power to be developed is 13,400 t.h.p., and the estimated cost is $1,000,000.

FALL RIVER MILLS, CAL.—Twenty-six land owners living east of Glenburn, in the eastern part of Shasta county, have petitioned the Supervisors to establish the Fall River Irrigation District to embrace their holdings, aggregating nearly 9,000 acres. It is proposed to irrigate the land with water pumped from Fall River, a never-failing stream, by electrical power. The lift will be a short one and the cost of electric power small compared to the great advantage to be derived. The petition will be considered by the Supervisors December 3.

MACDOEL, CAL.—At a meeting of land owners held here preliminary steps were taken toward organizing an irrigation district to be known as the Butte Valley Irrigation District. A petition bearing at least 110 signatures will soon be presented to the County Supervisors requesting permission to organize. According to the surveys and estimates made by engineers in the state an adequate supply of water can be impounded for the successful irrigation of at least 10,000 acres of valley land which without water is generally admitted to be of little or no value.

SAN FRANCISCO, CAL.—J. B. Olcess and F. N. Rector, Merced, Cal., have filed an application for 700 cubic feet per second from Merced River, Mariposa county, for development of power for manufacturing, pumping, transportation and lighting. Diversion works consist of concrete dam 15 feet high, about 300 feet long on top and about 100 long on bottom, and pipe line about six miles long. The amount of water to be stored is about 150,000 acre feet. The storage dam to be of concrete, about 150 feet high, about 700 feet long on top and about 150 feet long on bottom. The estimated cost is $200,000 for power house, $500,000 for power line and $500,000 for dam.

MADERA, CAL.—The petition for the proposed Madera Irrigation District was filed with the Board of Supervisors. Protests were filed by Miller & Lux, G. W. Mordecai and by the San Joaquin Agricultural Company (J. W. Goodwin). The board will set a date at some future time to hear the protestants. It is tentatively agreed, should the board deny the protests and approve the district plan, that an election will be called early in February. The proposed district will include something like 300,000 acres, and water will be secured from impounding some 600,000 acre feet at Friant, and 60,000 from the Chowchilla and Fresno rivers, and an additional 150,000 by pumping.

OAKDALE, CAL.—The immediate construction of the Spicer Meadows storage project, to cost two and a half million dollars, jointly by the Hobart estate and allied interests, with the Oakland Irrigation District and the South San Joaquin Irrigation District, was urged by the capitalists interested at a meeting held with the irrigation directors. The proposal as outlined was for the construction of a reservoir at Spicer Meadows at cost estimated at $2,500,000, of which the interests named and the irrigation district would each pay one-half. The proposed dam would store 60,000-acre feet of water and the company would be able to develop between thirty and forty thousand hp. The power interests agreed that they would permit 40,000 acre feet to be turned loose during the months of July, August and September, although they could use but one-half this amount for power purposes. The remaining 20,000 acre feet would be held in reserve for the latter months of the year. The company now owns 9000-acre feet of storage and plans to develop 6000 additional, from which the districts would benefit. They also made a tentative agreement not to sell water for agricultural purposes, other than to the two districts.

THE PACIFIC SOUTHWEST

LOS ANGELES, Cal.—The Ventura Home Telephone & Telegraph Company has petitioned for dissolution.

SAN DIEGO, CAL.—The city council has passed an emergency ordinance providing for $12,000 to be used for the construction of the Barrett Dam.

KINGMAN, ARIZ.—The San Carlos Dam will be erected to a height of at least 260 ft. above the bed of the Gila River. $250,000 will be appropriated for reclamation projects.

LOS ANGELES, CAL.—A reservoir for Westgate's $700,000 water system to be built in Stone Canyon will be started soon. A construction camp has already been created in the canyon.

NOGALES, ARIZ.—The matter will be taken up with the Douglas Traction & Light Company for the establishment of a car line to Agua Prieta. Aid will be given by the State of Sonora, if same will be built.

VENTURA, CAL.—The United Concrete Pipe Company has been awarded the contract for the construction of an irrigation system for the Berylwood Investment Company on their ranch near Somis. The cost is about $20,000.

LOS ANGELES, CAL.—Application has been made for a 21-year franchise to install and operate a double track street railway on New Broadway between 10th and Pico streets, by the City Railway Company of Los Angeles.

EL CENTRO, CAL.—The estimated cost for the All-American Canal—from Laguna Dam to Imperial Valley entirely on American soil—will be $3,333,545. The report has been signed by Dr. Elwood Mead, C. E. Grunsky, and W. W. Schlecht.

WINSLOW, ARIZ.—The Winslow, Arizona, electric light and ice property will be taken over from the Santa Fe Railway January 1, 1920, by a company being formed by Mr. W. C. Quebedeaux. A complete electrical supply store is being made ready to open on that date.

LOS ANGELES, CAL.—A dam is to be constructed in Whitewater River wash near Palm Springs. The valley storm water board has let the contract to a Pomona contractor for the construction at $15,865. It is to be completed by Jan. 1st. A similar dam will also be constructed in the arroyo east of Thermal.

TOMBSTONE, ARIZ.—W. R. Elliott, engineer and superintendent of the Salt River Valley Water Users' Association has been retained by the farmers who are pushing the Charleston Dam irrigation project. He has been looking over sites with the idea of laying out canals, etc., for a system of irrigation ditches.

SANTA FE, N. M.—Preliminary notice has been filed in the office of the state engineer by Mayor Grayson, that he intends to apply for all the unappropriated water in the Gila River above Redrock. Engineers are preparing a report. The project will provide for all unappropriated water; about 2400 acres will be irrigated.

LOS ANGELES, CAL.—Application has been made to divert water from Temecula Creek for the purpose of irrigation and furnishing water for domestic purposes for 15,000 acres in Riverside county, by Margaret Vail, N. R. Vail, Mary E. Vail and Mahon Vail of Los Angeles, and William Banning of Sonorita, Ariz., operating as Vail & Co. Diversion works will consist of pipe and open canal and dam 115 ft. high, dam to be of rubble, concrete and cyclopean masonry. The estimated cost is $200,000.

SANTA FE, N. M.—Application has been filed in the office of the state engineer, on the reservoir site on Pecos River in Eddy county, about five miles north of the Texas state line, by O. C. Thorpe of Fort Worth, Texas. Maps, plans of dam, conduits, etc., are filed on a reservoir site near Red Bluff. Total cost of project, $600,000. The project is for power development only, and the water to be used for power purposes will be turned back into the Pecos at the Texas state line. The project therefore admits of no use of the water for irrigation in New Mexico.

THE INTER-MOUNTAIN DISTRICT

OGDEN, UTAH.—It is the intention of the Ogden, Logan & Idaho Railroad Company to separate the operation of its interurban lines from the city street car lines. Probable operating economies are the reason for their action.

SALT LAKE CITY, UTAH.—Application has been filed by the Whitmore Oxygen Company of this city for thirty second feet of water to be taken from Little Cottonwood creek. The company plans to provide lighting facilities for the town of Wasatch.

BOISE, IDA.—A movement is on foot by farmers of the Minidoka project to construct an additional power plant for pumping purposes. The power will be generated from either the American Falls or Lake Walcott, and the plan is favored by the irrigation districts of both Rupert and Burley.

RUPERT, IDAHO.—At a special meeting of the city council recently, the mayor was authorized to sell $60,000 worth of bonds voted early in the present year, to take over the electric plant. A complete inventory of the property is being made jointly by city and company officials, to determine upon a fair price for the property.

SALT LAKE CITY, UTAH.—This city is receiving considerable complimentary advertising from the appearance of a recent article in the Saturday Evening Post by Floyd W. Parsons, entitled "Affairs and Illumination." A photograph of Salt Lake City's "White Way" lighting system is used by the author as an example of high class illumination.

HYRUM, UTAH.—City officials have been converted to the idea that all electric service should be on a metered or measured basis. Recently it was necessary to shut down the municipal plant, and as the city is now purchasing current from the power company on a wholesale metered basis, they are taking steps to meter all service to the various customers.

Beginning with the issue of January first

Office Records — Their Filing and Indexing

by IRENE WARREN,
Director of the Chicago School of Filing and Indexing

A series of twelve articles which will meet the office needs of your organization, large or small. Miss Warren covers such subjects as equipment, filing systems, the use of the files, card records and the handling of special situations.

Let a Specialist Solve your problems

Living in this day and age may be beyond your means, but if you are contemplating suicide as a way of escape, read this:

THE HIGH COST OF——

When a bachelor wight, I took little delight
In days that were loveless and lone.
The world I would comb to establish a home,
With a cute little wife of my own.
But when it was done, and the tradesmen, each one
The prices and rents began shoving,
My wedded bliss seemed hardly all I had dreamed—
And I learned of the high cost of loving.

Up, up in the sky, as the little birds fly,
The rates upon rations went soaring,
And if one should beg for a measly egg,
The price set one's pocketbook roaring.
The prices on bread—I hope I may be dead,
If they didn't go raving and roving,
While the baker would sigh, with a cynical eye—
"Can't be helped! It's the high cost of loaving!"

And the laundryman's boy filled my life with annoy,
And rifled my pockets of dollars
Each time he would count up the growing amount,
He assessed me for wrecking my collars;
And the water bill, too, took the general cue,
'Till I cut down my bathing and shaving,
For I found there's no end to the general trend—
And I wept o'er the high coast of laving.

They first blamed the war, then the armistice for
The price, and my heart began seething
With fear, bye and bye, lest they try to get by
With a charge upon hearing and breathing.
And the revenue laws some will cite as a cause,
Or politics blandly they're giving
As reasons of weight for the terrible state
That is known as the High Cost of Living.

I have tackled the game 'till I say, without shame,
I am conquered and utterly broken;
I am tamed, I am licked, my last kick has been kicked,
And my last word of protest is spoken.
I would flee, with loud cheers, from this dim vale of tears,
And would leave all the profiteers grieving—
But alas, I am cowed! I've been pricing a shroud—
And I can't stand the high cost of leaving.

DEAN COLLINS.

* * *

A discriminating mule who seems to have read the statistics on "better lighting and industrial efficiency" is the hero of a story told in connection with Edison mule lamps.

Hauling a train of coal cars in a mine is risky. Walking in the dark, a mule may stumble and break a leg, or be run over by a coal car, or anything.

At the request of a certain mine manager, the mule lamp was tried on a certain mule with great success. Next day when his driver went on the job the mule balked on pulling the load. No reason; just refused to move. No amount of persuasion or profanity would start the animal.

The driver in despair had about given up the job and was on the verge of building a fire under him when a bright idea came to mind. Hot footing it to the shanty he secured the lamp used in the previous day's experiment, and attached it to the mule. Off went "Jazboo" like a streak! It wasn't long after, at the decision of the mine manager, that every four-legged animal in the mine had a lamp of his own.

* * *

"New lamps for old" was a good selling slogan in the case of Aladdin's wife, but "sweepers for cows," though slightly more startling worked exceedingly well with a certain Texas housewife.

While canvassing his territory in a special effort to sell suction sweepers, a salesman called on a prominent woman. The latter liked the sweeper, but felt that she could not afford $57.50 at that particular time, because of a Liberty Bond payment being due. In the course of the conversation she intimated that she would possibly be interested in trading her milch cow for the sweeper. The salesman promptly walked out to inspect the cow, and after doing so informed the prospective customer that he would deliver the sweeper in about an hour. Later he drove up to the company's office in his auto with a nice Jersey cow trailing behind at the other end of a rope. In less than an hour later he had sold the cow for $57.50.

* * *

Half a minute in the complaint department of a central station:

Ding-a-ling-a-ling!!!!

"Hello. You say that your cat got in the fan and it won't start again. Well, look into the fan again and see if you extracted all the cat—good bye."

The ringing of half a dozen 'phones at once.

"———!? $$%?! ×=!!!!"

Then, after lifting one of the hooks:

"Complaint department, madam. Your lights won't burn? Have you tried pressing the wall switch? . . . Then try the snap on the plug socket. Good bye."

"Hello. What? No, this is not the Humane Society—complaint department for the —— Light and Power Co. That's all right, good bye."

"Hello. Yes, this is Sarah. Not now. I'm busier than the Old Boy himself, but I will see you after work. Be a good boy—(smack)."

"Complaint department. What? You will have to see the Police about that. We have nothing to do about that."

And so forth. This would be considered a slack period.

EMERSON EASTERLING.

Have you ever tried to talk into seven telephones at once and look pleasant?